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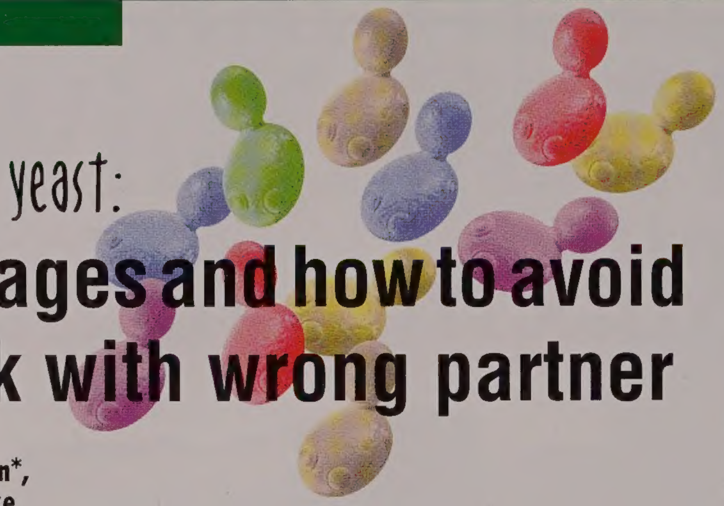

Grape juice and wine yeast:

Happy marriages and how to avoid getting stuck with wrong partner

BY Simon A. Schmidt, Simon Dillon*, Radka Kolouchova, Paul A. Henschke, Anthony R. Borneman, Angus H. Forgan, Paul J. Chambers, Isak S. Pretorius,
The Australian Wine Research Institute, Glen Osmond, Adelaide, SA Australia
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There is a plethora of wine yeast strains available for winemakers to choose from. Some are more robust and reliable than others, and different strains will impart different sensory properties to wine; the choice is not always straightforward. Research at the AWRI is beginning to unravel the complexity of grape juice composition and how this impacts on wine yeast performance. In parallel with this, AWRI is also unravelling the complexity of wine yeast genetic diversity. The convergence of these complementary approaches will pave the way for development of optimized wine yeast strains and provide a means for more informed choices to be made when winemakers are partnering a grape juice with a wine yeast.

Partnering grape juice with a wine yeast can produce a match made in heaven or a disaster waiting to happen. For a perfect marriage, the juice will be a generous and nurturing partner, catering for all of a yeast cell's needs, with the yeast reciprocating by helping the grape juice reach its full potential. In such relationships, fermentations proceed without a problem and produce top quality wines.

At the other end of the spectrum, when a juice is harsh and unforgiving, providing a hostile home, the yeast is required to be more robust and adaptable; many wine yeast strains fit this bill. However, some strains may not be able to cope with difficulties in the relationship, becoming stuck and requiring intervention of a therapist (the winemaker).

Most vinification relationships probably fall between these extremes, requiring at least some attention from their therapist, without being excessively needy or becoming stuck. Scientists at the AWRI are beginning to explore the complexity of grape juices and wine yeasts and what makes a good match to produce wines reliably and efficiently for an ever more discerning and diverse marketplace.

The approach used for this work has been systems-based: instead of identifying individual components (a specific gene or metabolite) that impact on one characteristic of grape juice, yeast or the wine they produce, AWRI experiments take a "helicopter view."

For example, in AWRI yeast work we characterize the entire genome (all of the genes in an organism) for the yeast strains we are interested in. This comparative genomics strategy enables us to identify, at the level of DNA sequences, all of the differences among wine yeast strains. The next stage of this work will be to align these differences to determine which are important for desirable and undesirable traits in yeast. This knowledge will enable more informed strategies for development of optimal wine yeast strains and it will provide a means of rapid screening of existing culture collections and natural isolates.

Similarly, with grape juice, AWRI has taken a wholistic (so-called omics) approach where as many elements in juices are identified as possible, rather than targeting one or two that we believe may be important. By comparing the compositions of different grape juices and aligning

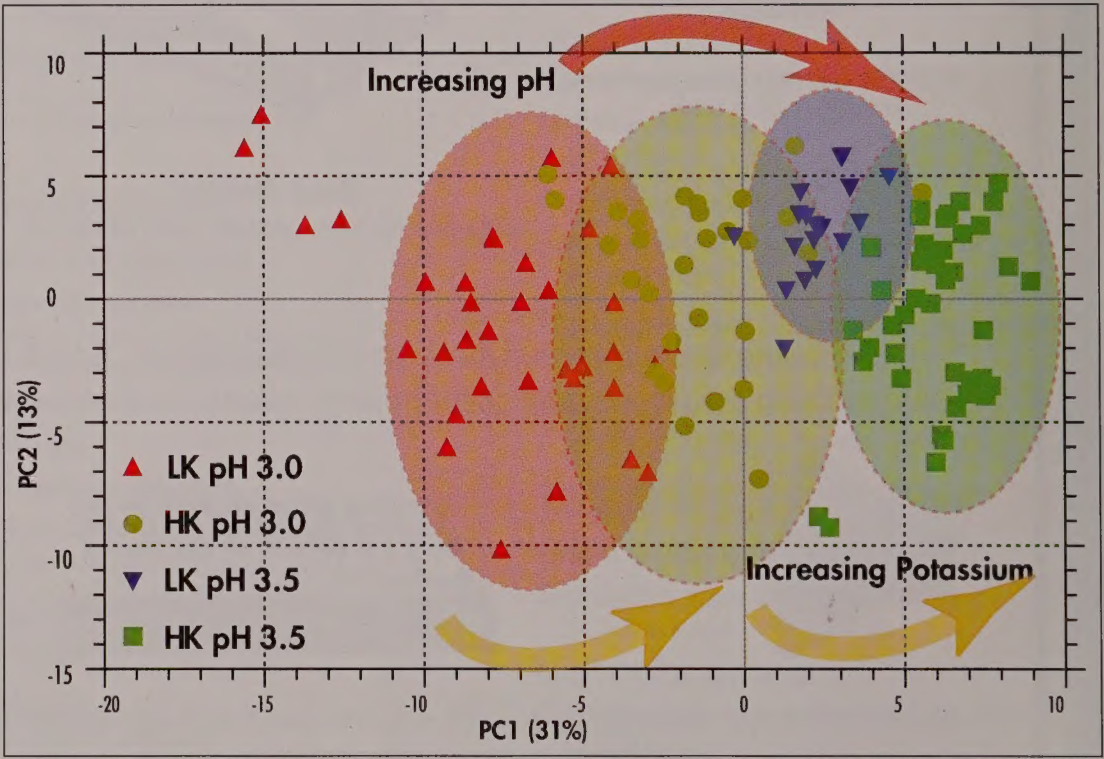

Figure 3. Influence of medium composition on production of fermentation volatiles. Analysis of 68 fermentations, with variations in both yeast strain and elemental composition, identified changes in pH and potassium levels as the predominant factors leading to variation in fermentation volatiles. This is shown in the above principal component analysis. The first principal component (on the X-axis) is a measure of the majority of variation in the sample (31% in this instance) and pH and potassium treatments (grouped by colour) separate samples in this axis.

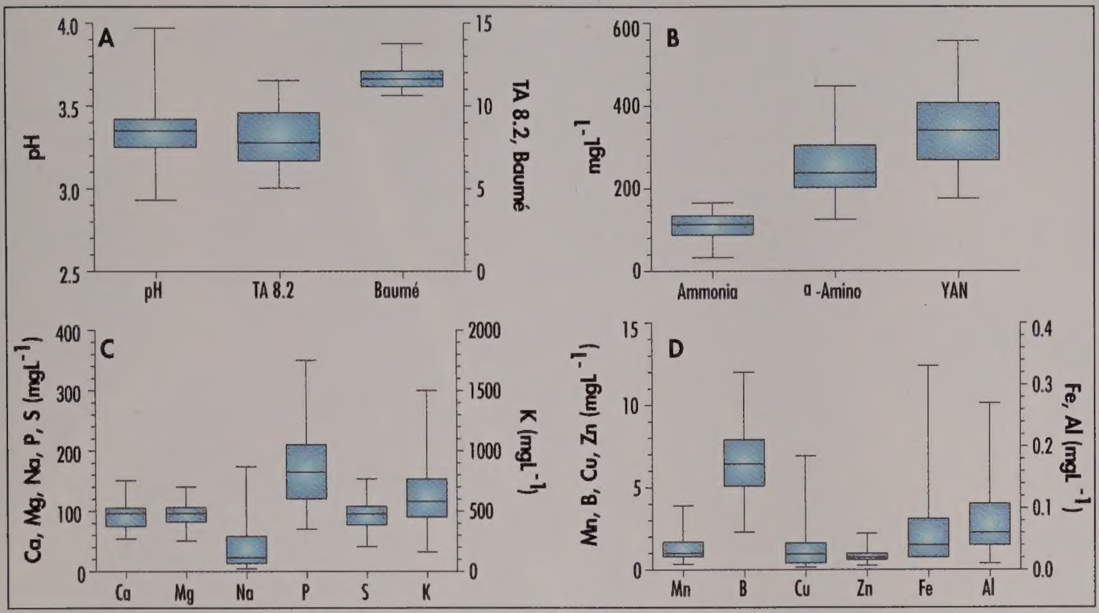

Figure 1: Compositional profile of Chardonnay juices surveyed during the 2009 vintage. Box and whisker plots showing the median values of pH, TA, Baume (A), nitrogen composition (B), macro-elemental composition (C) and trace elements composition (D) with whiskers showing the total range of concentrations observed for each analyte. Boxes show the upper and lower interquartile range in which 50% of all surveyed juices are found.

these data with fermentation performance, AWRI has identified elements of grape juice that determine whether it will make a good partner for wine yeast. A dating service, if you like, with a high probability of success.

Given the potential scope of this research, a clear and focused starting point was critical. Therefore, AWRI chose a single grape variety, Chardonnay, for the juice component of the work; this variety was chosen because of its prominence in the Australian winemaking landscape.

The goal of AWRI was to identify the variation in Chardonnay composition as a whole and to understand better how, and to what degree, variations in composition affect fermentation outcomes. A survey of Chardonnay juice elemental composition was performed during the 2009 vintage. The influence of variation in juice composition on fermentation outcomes, was explored using a defined medium; the recipe for which was based on Chardonnay composition. The performance of multiple yeast strains were assessed. Observations made in defined medium experiments were substantiated using Chardonnay juices saved during the survey component of this work.

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The exploration of Chardonnay juice has identified juice pH and potassium concentration as critically impacting on fermentation performance and wine quality, and this was in a yeast strain-dependent manner. Much of the work discussed in this report is the subject of a recent publication.[4]

How does Chardonnay grape juice composition vary?

To answer this question, samples of 100 Chardonnay juices were collected. These juices were produced at The Yalumba Wine Company winery (Barossa Valley, SA) from grapes sourced from seven distinct Australian wine regions: Adelaide Hills (SA), Barossa Valley (SA), Eden Valley (SA), King Valley (Vic), Riverland (SA), Tamar Valley (Tas) and Wrattonbully (SA). These areas encompass a range of climatic and geological types from the cool dolomite soils of the Tamar Valley, very warm red clay loam of the Barossa Valley to *terra rossa* soils of Wrattonbully.

Overall, the 2009 vintage was a dry one with below average rainfall and average temperatures. However, the vintage was punctuated by a two-week heat wave toward the end of January and into early February, in which daily maxima were above 35°C and with consistently high night-time temperatures. All seven regions were affected. The juices were sampled between January and April immediately prior to the commencement of fermentation. The ranges of major and minor juice component variation are shown in Figure 1.

The yeast assimilable nitrogen (YAN) levels for all juices exceeded the generally accepted risk threshold for suboptimal fermentation performance although some juices were at the lower end of what would normally be considered desirable.[1] In general, elemental concentrations were also greater than previously reported as necessary for robust yeast growth.

The juices sampled were destined for either still or sparkling wine, which may explain the wide range of both titratable acidity (TA) and pH observed. It has long been understood that management of these parameters is key to obtaining a balanced wine style and ensuring wine stability in the bottle.[5] Copper concentrations were relatively high but were not inhibitory to fermentation, even at the highest concentrations observed. Similarly, sodium concentrations were below levels known to be inhibitory.

How does elemental composition influence yeast fermentation performance?

It has been suggested previously that an imbalance of magnesium with other cations, in particular calcium and zinc, is a potential cause of sluggish or stuck fermentations;[15] management of zinc is critical in brewing. In addition, while it is known that limitation of some elements can impact on yeast growth and fermentation performance, mineral nutrient limitation has not been demonstrated in grape juice or grape juice-like media. Therefore, until now, we did not know whether some mineral nutrients are potentially limiting in grape juice.

The effect of variations in juice elemental composition

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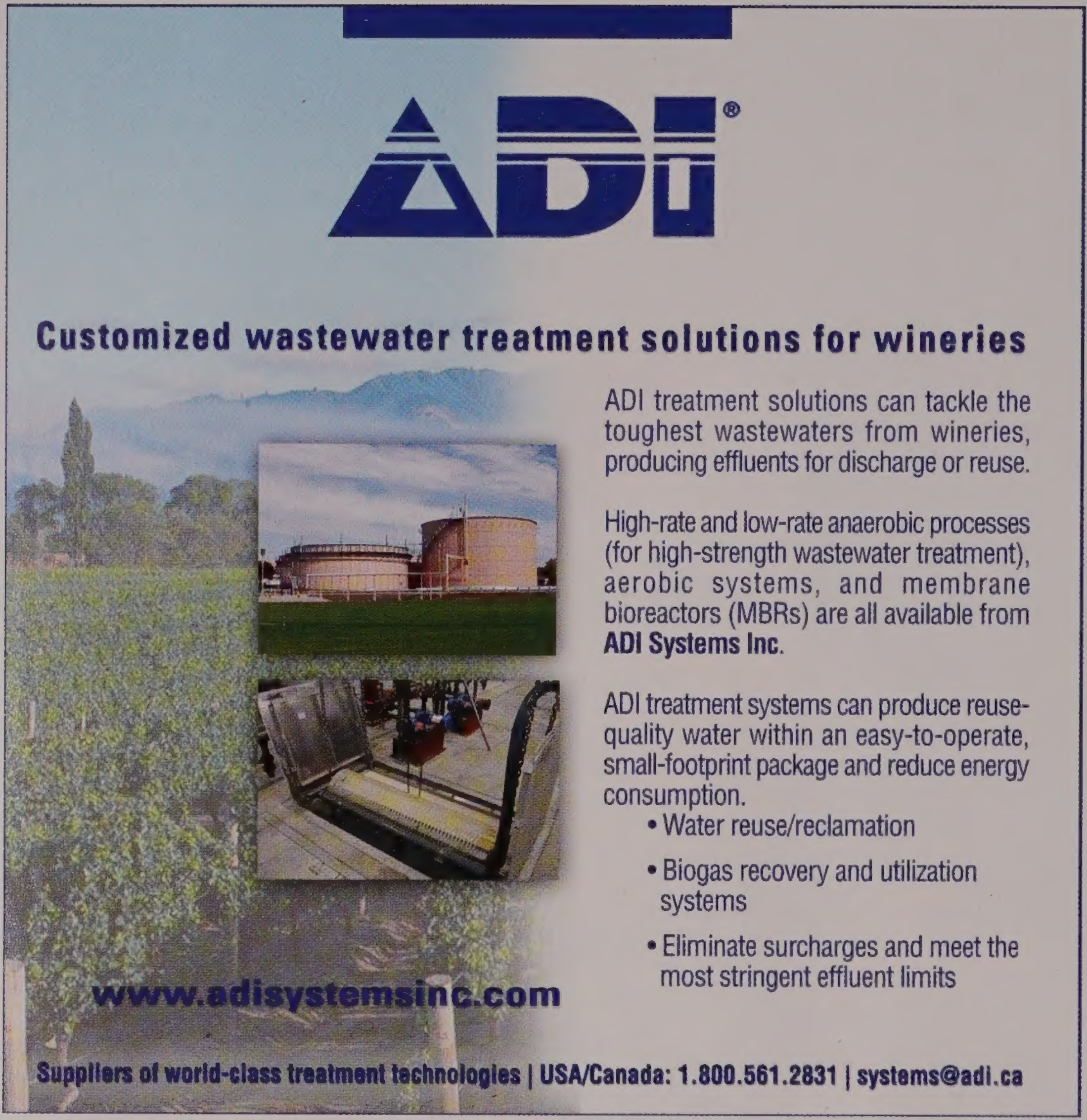

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on yeast fermentation performance was evaluated systematically. This was done by spiking defined medium, prior to inoculation, with individual elements, such that their final concentrations matched maximum observed concentrations in juice while keeping all other elements at their minimum. This was then compared with defined medium in which all elements were at their minimum concentrations.

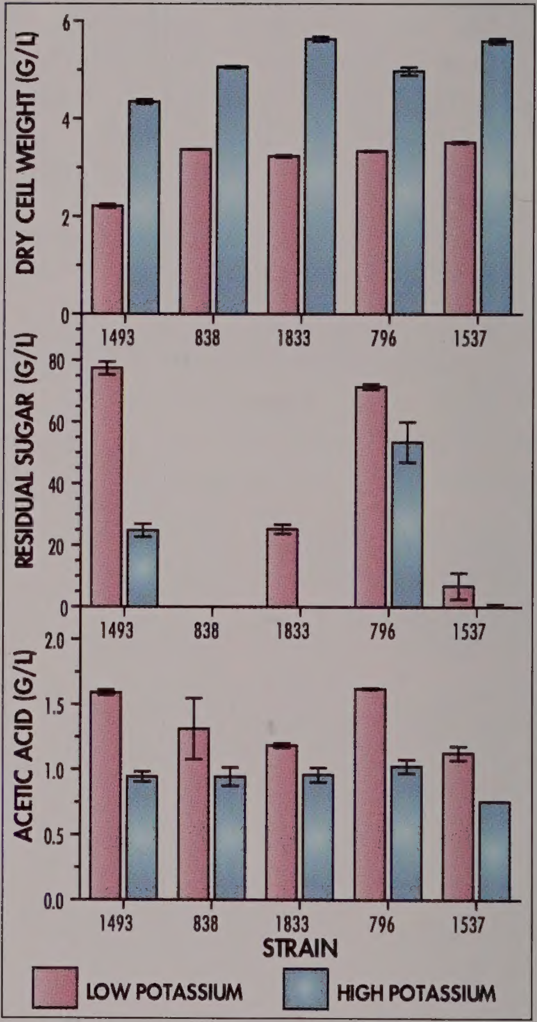

Figure 2: Screening wine yeast strains for performance and wine quality indicators. Five wine yeast strains were compared in defined medium (pH 3.0) containing low and high potassium concentrations. Potassium concentration at low pH impacts clearly on fermentation outcomes. The residual sugar concentrations indicates that AWRI 1493 and AWRI 796 are particularly sensitive to 'low potassium' at low pH. Bars in graphs show average values of three fermentations. Error bars represent standard deviations from the mean.

Neither the nitrogen or sugar profiles were varied because the impact of these on fermentation performance is already well understood. However, the basal defined medium used in this

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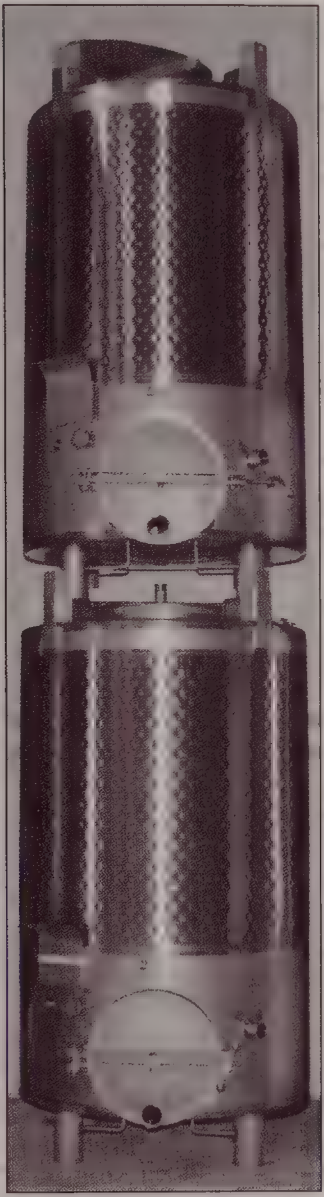

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work had a high initial sugar concentration (250 g/L) and low initial YAN content (170 mg/L) to match extreme values observed in the survey.

Of all the different elemental conditions evaluated, only low juice pH in combination with low juice potassium impacted negatively on fermentation performance (Figure 2), leading to reduced yeast growth, high residual sugar, higher volatile acidity, and longer fermentation times than when the pH and potassium levels were in the normal range.

There is a well-known correlation between pH and potassium levels in grape juice.[7,11,13] Potassium precipitates tartaric acid (producing bitartrate) thereby increasing pH; the more potassium present in grape juice the lower the tartrate and the higher the pH.[5,12]

It is interesting to note, in the context of potassium concentration in grape juice, that grafted Chardonnay vines tend to produce juice with lower potassium concentrations than vines grown on their own roots and this is contrary to most other wine grape cultivars.[11,16] In addition, lower potassium and pH profiles are usually associated with free run juice whereas increased pomace or skin contact,[14] or increased canopy density during ripening,[10] tend to generate juices with higher potassium and pH.

No beneficial effects were observed on fermentation performance from increasing calcium, zinc or magnesium concentrations to their maximum observed values, at least in defined medium. In fact, the addition of calcium exacerbated poor performance only when potassium concentrations and pH were low. Given that both magnesium and calcium are in excess relative to yeast minimum requirements and present in equivalent quantities,[6,8,9] the potential for calcium-mediated inhibition of magnesium uptake is extremely limited. Taken together these observations suggest that imbalances of calcium and magnesium (or other divalent metal ions) are unlikely to play a role in fermentation outcomes in Australian Chardonnay production.

Do yeast strains differ in their response to grape juice composition?

AWRI experiments show at least three different yeast strain-dependent responses to low pH: indifference; inhibition of fermentation progress that is responsive to potassium addition; and inhibition of fermentation performance that cannot be rectified by potassium addition alone (**Figure** 2). The degree to which fermentation was inhibited by low pH was demonstrated in defined medium experiments, comparing the performance of different wine yeast strains in a high sugar and low nitrogen environment.

Yeast performance in this environment is characterized by slow fermentation rates, slow growth, lower

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biomass formation and increased acetic acid (Figure 2) and glycerol production (data not shown). Chardonnay fermentations exhibited many of the same features as those conducted in defined medium, although effect magnitudes were attenuated (data not shown).

Does elemental composition affect how a wine smells?

Volatile metabolites can account for much of the variation in wine style arising from the use of different yeast strains.[3] The contribution of elemental composition contributes to variation in wine volatiles was investigated by assessing 68 fermentations with different combinations of medium composition and yeast strain. Principal component analysis of volatile fingerprints from these ferments provides a window into the relationship between medium composition and volatile production (Figure 3).

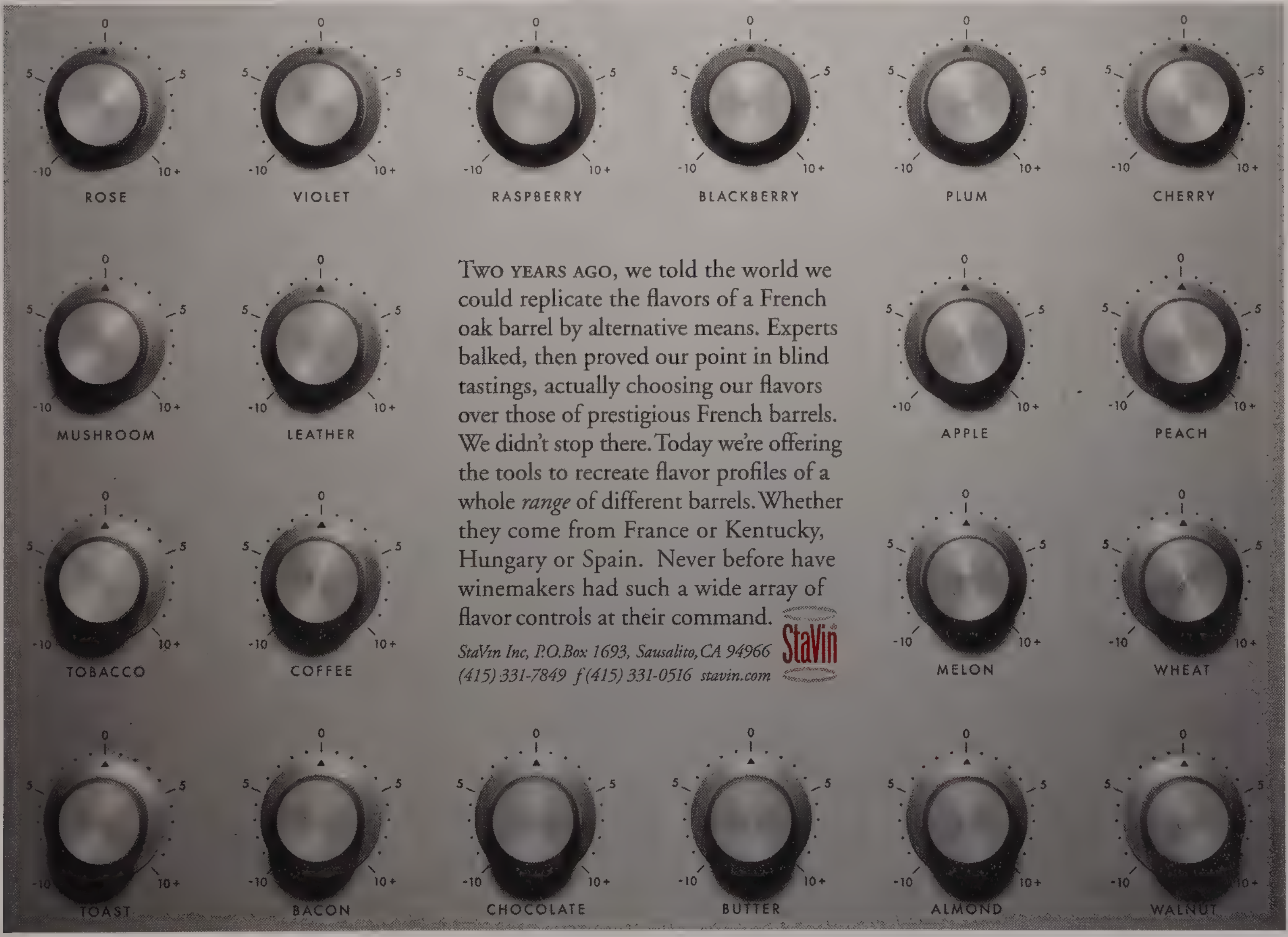
The greatest variation in profiles of volatiles could be explained by variations in pH and potassium concentration (31%, by definition, principal component 1). In fact, pH and potassium gave rise to more variation in the volatile fingerprint than any other parameter including the yeast strain used, regardless of whether or not the ferment went to completion. This analysis excluded acetic acid (VA), which is a major contributor to sensory characteristics in its own right. These preliminary findings, while requiring more detailed investigation, indicate how influential juice composition can be on fermentation kinetics and wine sensory characteristics.

What is the basis for different sensitivities of different wine yeast strains to limiting potassium and low pH?

Unraveling variation in grape juice composition gives a picture of what constitutes a good fermentation partner for wine yeast. This has enabled identification of two components of juice, pH and potassium; the levels of which are critical for optimum fermentation efficiency. To understand better the relationship between fermentation partners we require knowledge of the genetic variation between wine yeasts. This is being achieved using comparative genomic analysis; we have compared the entire DNA sequences of several different wine yeast strains.

To date, AWRI has published the genomic sequences of four commercially available wine yeast: Lalvin QA23, AWRI796, Vin13 and VL3,[2] with several other strains sequenced not yet publically available.

While it is early in the research, we can see that wine yeasts form a cohesive group and these are genetically different to yeast strains used in other industries (beer, biofuel, and sake production). These genetic differences are often on par, and sometimes exceed, those that separate humans and chimpanzees.



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While the genetic differences that separate wine yeasts from each other are much fewer, the level of genetic variation is nonetheless generally greater than that which separates individual humans from each other. It is this variation which is ultimately responsible for the different behavior of specific wine yeast strains during the fermentation process and, in the same vein as medical research which seeks to link human genetic variation with genetic diseases, we are now working to link wine yeast genetic variation with wine relevant traits (both positive and negative).

Conclusion

Grape juice and wine yeasts are complex, and their coupling to produce wine reflects this. For example predicting, with accuracy, the quality of a wine from its starting ingredients can be a rather "hit and miss" affair, and the problem of suboptimal fermentations still takes winemakers by surprise from time to time.

Results from work on grape juice composition and comparative yeast genomics, and the convergence of these approaches, will enable more informed strategies for winemakers so that they can make the best choice when coupling grape juice and wine yeast. AWRI is already in a position to say that, at least for Chardonnay juice, if the pH is low, you can minimize the risk of a stuck or sluggish fermentation by choosing a robust strain that is more stress-tolerant and will keep fermenting in a "hostile" medium in which most other strains will stop. ■

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BY James A. Kennedy Ph.D.
Professor/Chair, Department of Viticulture & Enology,
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California State University, Fresno

Contrasts between Pinot Noir and other cultivars may bring to mind many clichés. "God made Cabernet Sauvignon, whereas the devil made Pinot Noir" — word association by André Tchelistcheff — is one that echoes in my mind when I think of Pinot Noir.

This variety which has been in existence since the middle ages,[7] is regarded by many as the greatest of wine varieties. In the wine world, this variety has a texture that can be sublime at times but difficult to consistently achieve. The same can be said about many other attributes of Pinot Noir: can be truly mind-blowing but all too often misses the mark. In short, it is often thought that this variety was meant for masochists.

Yet despite the mystical traditionalism Pinot Noir acolytes have historically applied to its production, the rapid development of new world Pinot Noir regions, and the wine's success in international competitions, suggest that technological improvements are making a contribution. The recent popularity of this variety and associated increases in production levels have provided us with an opportunity to learn much more about the requisite underlying technology of fine Pinot Noir production.

Several successful producers on the west coast of the U.S. shared Pinot Noir production with me. The most important points that I took away from these discussions were that these winemakers all seemed to have a singular passion for Pinot Noir, and this passion has sustained their interest in understanding the variety and discovering how to work with it. All of these winemakers seemed to draw very similar conclusions about Pinot Noir, applied to individual sites so that the best possible wines can be produced.

Contributing Winemakers:
Kirby Anderson; Gainey Vineyards
Kristen Barnhisel; Handley Cellars
Paul Clifton; Hahn Estates,
Eric Johannsen; La Crema,
Anthony King; Lemelson Vineyards
Greg La Follette; Tandem Vineyards
James MacPhail; MacPhail Family Winery,
David Munksgard; Iron Horse Vineyards,
Gabriel Ricketts; MacPhail Family Winery

Beginning in the vineyard and continuing through wine consumption, these wine producers are fascinated by the various factors that contribute to final wine quality. The following text is a summary of some of those factors and how scientists and producers are making inroads into the consistent production of fine Pinot Noir.

In the vineyard

There was no question that Pinot Noir requires special attention in the vineyard if quality is to be maximized. Wine producers who have worked with other varieties agree that Pinot Noir is a much more challenging variety to work with. But why is this so?

If we accept that, from a wine quality standpoint, all varieties generally perform best when planted on the cooler fringes of what is viticulturally possible for that variety,[1] then Pinot Noir stands out as distinct among the world's major varieties.

At 1,150 degree days,[19] Pinot Noir requires fewer growing degree days to ripen sufficiently, and therefore, it is generally planted in some of the coolest viticultural regions in the world, which are defined by a short growing season and inherently greater vintage variation.

Within the coolest sites, vineyards are often planted on slopes to maximize sunlight interception, and to minimize frost potential, soil water-holding capacity, and disease pressure. Because hillside sites are generally more heterogeneous than the valley floor, there is more variability in fruit composition, and this has been shown to have an impact on wine composition.[12,15]

Coupled with site variation, Pinot Noir grapevines have a considerable degree of variability. In addition to temporal changes, considerable vintage variation in fruit composition exists.[16,31] In cool climate viticulture, healthy, disease-free vines are important to maximize the potential for achieving optimal fruit composition at harvest, and Pinot Noir is no exception.[25]

There are many clones of Pinot Noir

PHOTO: Pinot Noir, Hahn Family Wines, Soledad, CA.

in the world,[4] and many variations in field performance.[9,36] Clonal variation in cluster morphology exists, with many tight-clustered clones that are more susceptible to bunch rot.[11]

Clones that perform well one year can be mediocre in a different vintage. Moreover, clones that may be fantastic for their aromatics may be lacking when it comes to structure. Because of these variations, many growers choose to plant a selection of clones to provide blending options in the winery, and to plant various rootstocks to reflect variations in soil profile and disease susceptibility. Unlike other famous red wines of the world, however, you rarely see other varieties as blending options for Pinot Noir. This is a single cultivar wine, damn it!

When all of this is put together, there is no doubt that any winemaker worth their weight in DRC — La Tâche will be making winemaking decisions well before harvest. This observation was very clear among winemakers that I spoke to.

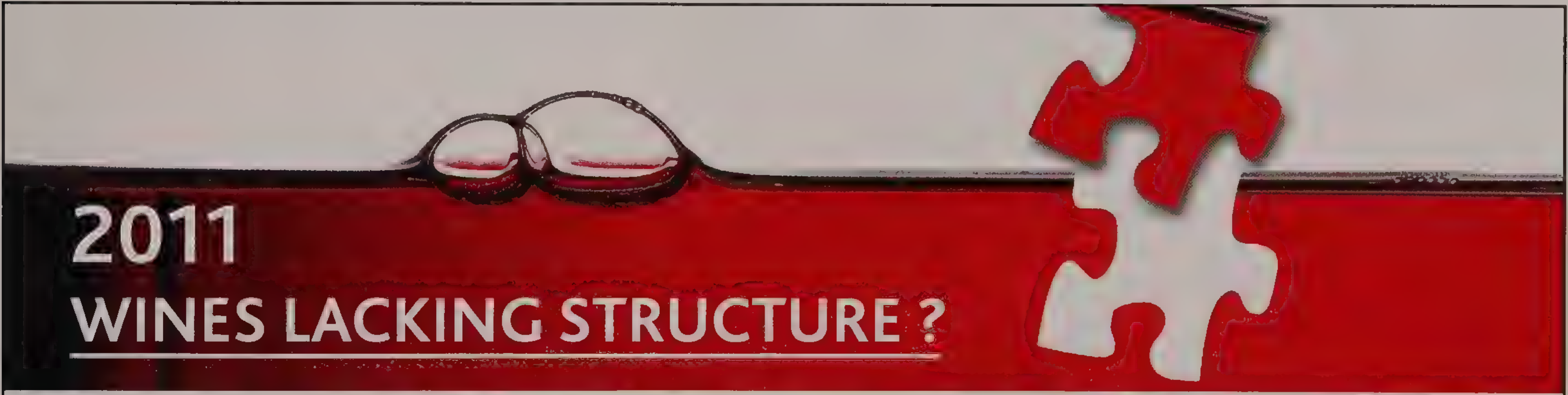
Small producers were proud of the fact that they studied their vineyards and wanted to understand the variations so that they could harvest when optimal for groups of vines rather than blocks. Large wineries seemed to be different in their approach to harvest, with picking decisions in many cases based upon economies of scale as opposed to any specific desire of the wine producer.

Of special note is the practice of growing grapes using sustainable and other alternative methods of production — a practice becoming increasingly prevalent among Pinot Noir producers. In Oregon, a recent survey of vineyards using sustainable farming practices indicates that 29% of vineyard acreage meets these criteria. Along with an increasing interest in alternative production methods, there has been an increase in research on the effect of these practices on vine health, fruit quality, and defining what it means to farm sustainably.[22,23,27,34]

Harvest and prefermentation

As with other varieties, the date of harvest is often the most important day in the life of a wine. In most cases, the composition of the fruit is "fixed" at this time, and most winemakers would say that if the chemistry of the incoming fruit needs to be adjusted, then achieving balance in the wine is never as effective as it could have been without intervention.

For the compounds that are important in aroma, flavor, and mouthfeel, research has not advanced to the point of being able to efficiently and precisely manage wine sensory composition in the vineyard. Because of this, all winemakers interviewed spend a considerable amount of time in the vineyard drawing conclusions about the relationship between vineyard production practices and wine composition.



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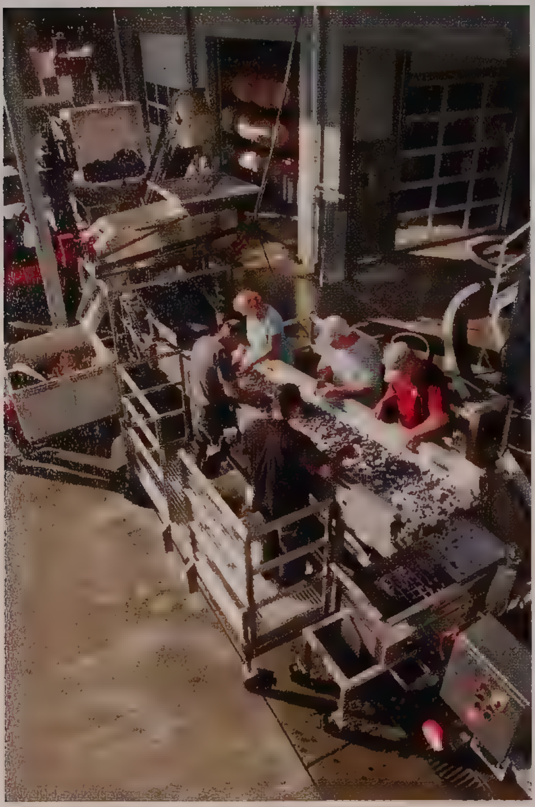

Gentle handling of Pinot Noir at Trione Vineyards & Winery

Designing the grape handling and processing at Trione Vineyards & Winery [Geyserville, CA], was an equation with many variables. Scot Covington, winemaker, had three goals: to handle the fruit as gently as possible, to achieve output of 1-5 tons/hour, and to process at least ten different grape varieties. This meant that the destemmer must be able to adjust to the ease at which each grape variety came off the rachis, adjust to the softness of the skins, and to removal of shot berries.

"I wanted to sort before crushing so that I could control the rate of crushed fruit in each fermentor," says Covington. "I chose the Armbruster Roto-Vib destmmer. This unit has a rotating destemming shaft that vibrates and is infinately adjustable both in rotation speed and vibration frequency. I can also adjust the rotation direction of the cage. In all, the variability allows for customization on the fly as the fruit is being destemmed.

"The flexibility allows more control of the destemmed fruit, whether it is soft-skinned Pinot Noir, Zinfandel or Merlot, or more firm-skinned Cabernet Sauvignon or Cabernet Franc. I want to have only whole berries coming across the sorting table, with the ability to determine the level of crushed grapes that I send to the fermentor. This system gives me that flexibilty and control.

A P&L Specialties' LT™ patented MOG removal machine is mounted underneath the destemmer removing unripe "shot" berries, stem jacks, raisins, and MOG via a wedge-wire screen, while a gentle shaking motion allows the whole, ripe berries to easily pass onto a sorting table. Retained grapes from the sorting table are transferred to an open-top fermentor with a peristaltic pump.

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Once fruit is harvested (hand-harvested into small totes or half-ton macro bins), it is brought to the winery for processing. For Pinot Noir, many winemakers note that oxygen exposure and oxidation reactions are important from the very beginning of winemaking. Cool harvest temperatures, little fruit damage, intact clusters, and minimizing the time from harvest to fermentor are important concerns.

For essentially all winemakers, destemming without crushing is preferred to help slow down extraction of tannins in general and seed-derived compounds in particular. By retaining more whole berries, winemakers also perceive brighter fruit in the final wine.

Some notable exceptions to this practice include those of Paul Clifton (Hahn Estates, Monterey, CA) who states, "For the most part, I do not follow this practice with fruit from our vineyards. I have experimented with it, but from what I have observed and tasted, there was no improvement in wine quality. Destemming, but not crushing creates variation that I would rather eliminate."

Clifton cites personal experience and variables such as distance to the winery, destemmer type, fruit condition (rachis condition), and fruit temperature as factors that ultimately lead to variation in the proportion of whole berries.

Greg La Follette (Tandem Winery, Sebastopol, CA) has compared crushed fruit with whole berry ferments and found that often whole berry ferments result in wines that are less intense/ extracted. "There is not much to be gained by doing a big effort to whole berry," says La Follette. "Energy placed in doing 'whole berry' should, instead, go into sorting. Bigger vineyards that naturally produce a lot of extract can use more whole berry to lift the fruit, while vineyards that struggle with intensity and extract would benefit from crushing to improve mouthfeel and overall texture."

Recent research conducted at Oregon State University indicates that a higher proportion of skin tannin results from berries that are crushed.[10] This would suggest that if the goal is to minimize seed tannin extraction, then crushing the fruit and pressing early would lead to a similar concentration of tannin yet with a higher proportion of skin tannin. This practice would likely result in faster fermentation rates, and thus, reducing the maximum fermentation temperature in order to slow down the fermentation, would result in elevated fruitiness.

Stem addition is observed by some winemakers either as a result of whole cluster inclusion to achieve low-level carbonic maceration, or deliberately to add additional complexity or spiciness

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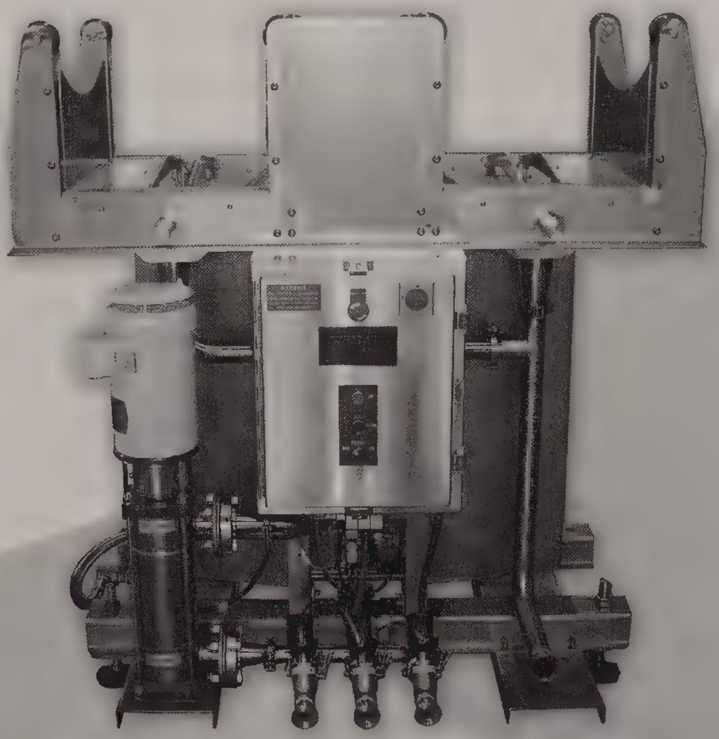

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The caution with stem addition is that it can lead to bitter, stemmy, or green-tasting wines.

"Tannins tend to become more aggressive and green flavors appear with 10% to 50% whole cluster fermentation," says Anthony King (Lemelson Vineyards, Carlton, OR). "There may be something to the old Burgundian wisdom that it is either 100% whole cluster or nothing. In our experience, 100% whole cluster fermentations never build up an excess of heat, and the heat is evenly distributed by the stems. The resultant wines are often lower in tannin than you might expect, and have more carbonic esters that persist and change through elevage to make a more complex wine in the end."

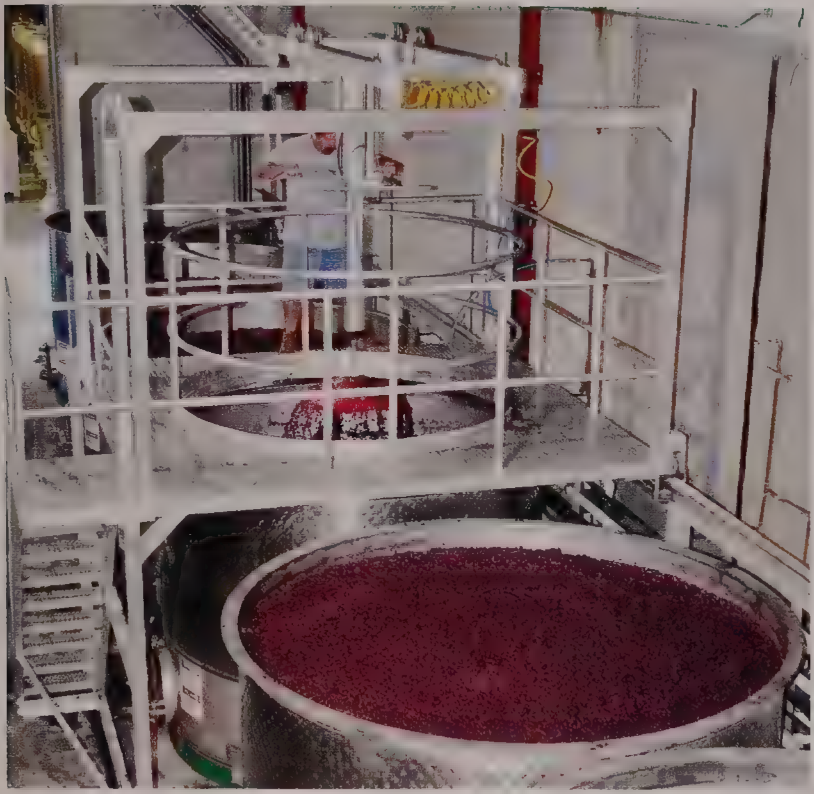
Most winemakers practice prefermentation cold soak; time and tank space permitting. Three to five days is a common practice. Several reported that the incoming fruit often comes into the winery quite cold and it takes a few days to warm up without intervention. More than with any other variety and perhaps almost exclusively, copious amounts of dry ice are used to keep the soaking must cool and minimize oxidation prior to fermentation. Initial differences in wine composition have been observed by using cold soak or dry ice addition prior to fermentation.[35]

Fermentation

A considerable amount of work has been conducted on understanding the role of fermentation practices on Pinot Noir composition and sensory properties.[3,17,18,45,46] These studies show that the winemaker has a large impact on final wine composition. Continuing advances in fermentation microbiology and biotechnology are providing a continuous source of new technology for managing and improving Pinot Noir quality and style.[33,39,29]

Many winemakers are analyzing musts for yeast assimilable nitrogen (YAN).[8,38] This practice is good insurance and the industry seems to have largely adopted this practice.

If nitrogen-deficient musts are observed, they are supplemented with superfood and diammonium phos-



Gentle handling of Pinot Noir at Talbott Vineyards

Talbott Vineyards (Gonzales, CA), reflects a philosophical divide between skin-accentuated compared to free run-accentuated Pinot Noir styles."

It goes deeper than gentle handling, and includes not employing the Saignee technique, or enzymes which alter the genetic hard-wiring of Pinot Noir," explains Dan Karlsen, winemaker. "Talbott Pinot Noir hopefully represents the 'fist in the velvet glove' approach, meaning great fruit character and extract without harshness.

"Our approach to Pinot Noir is to maximize the natural fruit flavors of Sleepy Hollow Vineyard while minimizing harsh phenolics. I believe the free run is the best part of the grape, and that skins possess negative characteristics which we avoid through gentle fruit handling.

"Grapes are hand-picked by pickers trained to sort/avoid leaves, rot, and green fruit as they pick. They are paid by the hour to ensure a good job. A Kappa 50 destems the grapes with no crushing into 1/2 ton bins, which are poured into eight feet x eight feet fermentors (7-8 ton capacity) by forklift. No must pump is used, ever.

"Inoculated fermentation is rapid and very hot (96° to 97° F). Sleepy Hollow has naturally dark color so we do no cold soak, extended maceration, or anything which alters the grapes' natural composition.

The punch-down device is fast (five minutes twice per day) with a 30-inch diameter paddle to essentially flip the cap, and minimize excessive damage to the skins, giving the anaerobes some air and the aerobes some reduction to reduce VA and sulfides. At dryness, we drain for an hour or so, shovel the fermented grapes into 1/2 ton bins and pour into the press. The hard press is blended with the 'free run' immediately, settled for 48 hours, and barreled.

"The Pinot Noir receives one crossflow filtration before bottling," concludes Karlsen.

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phate (DAP). Generally, available nitrogen in excess of 225 ppm is desired and nutrients, if needed, are generally added to the fermentation at the end of the lag phase (beginning of alcoholic fermentation) to ensure that the nutrients are available to *Saccharomyces* spp. A portion of the addition (up to 50%) is often saved to add to the tank when the fermentation is almost one-third complete.

Recent research at the Australian Wine Research Institute suggests that the prophylactic addition of supplemental nitrogen without prior analysis could lead to excessive available nitrogen concentrations and this may lead to formation of undesirable aroma compounds.[40,41]

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Pinot Noir winemakers are experimenting with yeast strains; Assmanshausen (Enoferm) and RC-212 (Lalvin) seem to be preferred. Assmanshausen provides a nice fermentation profile in that it is a slow starter yet, once started, it ferments well and there is no problem completing fermentation. Assmanshausen seems to result in good textural properties. RC-212 is good for extraction and a little faster ferment, and ICV-D254 (Lalvin), achieves good varietal character.

David Munksgard (Iron Horse Vineyards, Sebastopol, CA), uses BM45 (Lalvin) because it tends to add an earthy character to the wines.

Most winemakers interviewed conduct some indigenous/uninoculated ferments to obtain more complexity in the final wine.

Many winemakers note that the goal of their production is not to achieve a certain level of extraction, but to look for the right balance. Tannin distribution and composition has been shown to be influenced by time, cap management practice, and the level of crushing.[2,32,10] Given that these factors have sensory consequences, the winemaker's skill required to achieve a balanced extraction is evident.[42,43]

"I believe the Handley style of Pinot Noir has less to do with extraction and much more to do with finesse and balance," says Kristen Barnhisel (Handley Cellars, Philo, CA). "We are seeking forward fruit and a good balance of texture, tannin, and acid in the mouth, and a long finish. Pinot Noir is rather challenging that way — to find the point where all elements converge."

With balance comes variation in extraction, and La Follette notes that some vineyards just support more tannin. Ultimately the vineyard provides a good indication for extraction level.

Cap management

Most winemakers utilize punch down for cap management. "The reason for doing so seems to be one part logistics, one part style, and one part tradition," says Clifton.

For La Follette (an advocate of manual

punch downs), "The winemaker should be over the ferments a couple of times each day, smelling aromas, feeling the heat, judging the firmness of the cap. Pneumatic punch down devices and pump-overs do not do that, do not allow for a more intimate interaction to occur between the winemaker and the medium."

Because Pinot Noir plantings are often divided into small blocks, many winemakers ferment in small batches and, for these lots, it is often more convenient to punch down the cap as opposed to pump over. In several blind tastings, some wines produced using pump-over were preferred over those punched down. Several winemakers describe punch down-produced wines as having better texture and mouth-filling characteristics.

Anthony King notes that one potential issue with punch downs is that cap cooling is not as effective. He observes that pump-overs are better for controlling cap temperatures, and expresses some concern that punch down may lead to greater tannins and an increase in sulfide production due to stressed yeast.

Maximum fermentation temperature

There are various opinions with regard to maximum fermentation temperature, varying from 75° to 90°F with some targeting a 90° to 100°F cap temperature. Warmer temperatures are associated with an increase in the mid-palate structure of the wines and lower temperatures are associated with elevated fruitiness. Warmer temperatures can also lead to some reduction issues; if this occurs, some winemakers find that aeration helps to reduce the problem.

Little extended maceration

Extended maceration is not often used with Pinot Noir. Explanations for this include protecting the wine from oxidation and reducing seed tannin extraction. With extended maceration, green tannin extraction can become an issue, but mineral and savory-type complexity may be achieved.

When to press?

Pressing is often done as soon as the wine is dry, with some variation around this time (anywhere from 4° Brix down to dryness). Most winemakers will include press fractions up to about 0.4 bar but will not include anything else unless the wine needs more structure.

Cellaring (élevage)

Once the wine is pressed, it is typically allowed to settle the gross lees in tank for one to three days, and then the wine is racked to barrel. If malolactic bacteria is inoculated, winemakers generally add it at this time. All but one winemaker interviewed conduct malolactic fermentation in barrel. Malolactic fermentation can take up to eight months to complete.

Once malolactic fermentation is complete, wines are racked off the lees and SO_2 is added. For all winemakers interviewed, this was the

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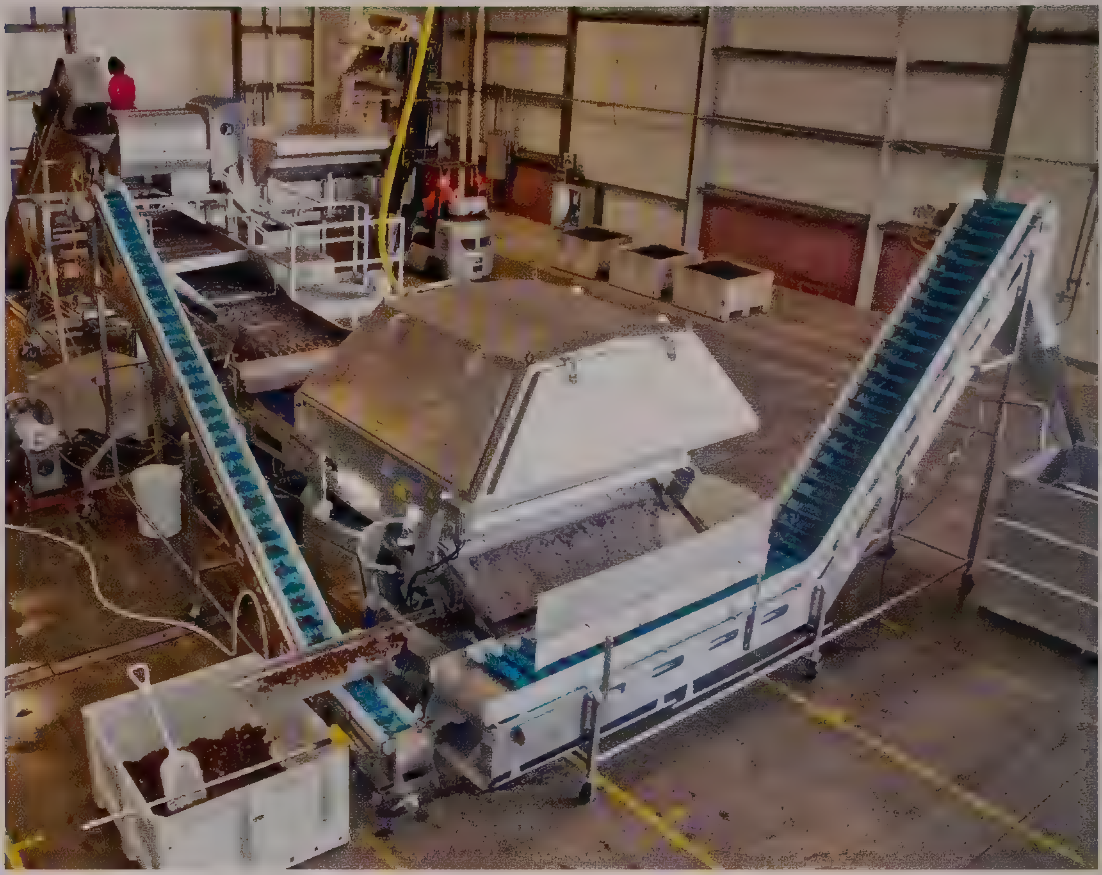

Gentle handling of Pinot Noir at Kendall Jackson, Soledad, CA

Kendall Jackson installed a Key Technology Manta optical grape sorter for the 2011 harvest in Soledad, CA to process Pinot Noir grapes. "We began speaking with Key Technology in 2010," recalls Randy Ullom, winemaster. "After discussing our needs and their equipment, and then testing grapes in their design lab, we ascertained they could deliver a product that met our criteria.

"Phase 1 of the trial was targeted to receive 15 to 17 tons per hour. We felt this would be a good starting point. Ideally, we were looking for a sorter that could receive 22 to 24 tons of machine-picked Pinot Noir grapes per hour. We chose Pinot Noir as a test because any hand-picked or Bordeaux grapes regardless of picking method (assuming it was picked with an onboard sorter), would be too simple and easy.

"Installation of the Key Manta optical sorter -- and a short window to test, manage, and adjust the design elements – brought heightened excitement to all. Key delivered an incredible asset: the sorter's optics (three cameras, two infrared lasers), variable rejection compressed air nozzles and air flotation technology, along with a minute pixel recognition program and system, are state-of-the-art equipment. Key's customer service was outstanding. The design team readily made modifications based on our needs as the trial progressed.

"As a result, we successfully met our Phase I goal of 15 to 17 tons per hour. Based on this success, we will continue with Phase II, increasing throughput to 22 tons per hour. The Pinot Noir grapes post-optical sorting looks like caviar -- effectively 100% MOG free -- and was transferred to open-top fermentors by a fork lift rotating bin dumper to transform through fermentation into soft, succulent, sensuous, velveteen Pinot Noir."

only racking that occurred. Some battonage (stirring of light lees) is a common practice. Beyond that and regular topping, it was generally considered that minimizing air contact was essential in high quality Pinot Noir production. Pushing wines with nitrogen is another practice that dominates wine movement with Pinot Noir.

Popular coopers for Pinot Noir

The choice of oak is French, with tight-grain selections from Allier, Bertrange, Tronçais, and Vosges. Participating winemakers in this report identified these coopers: • BelAir • Cadus • Damy • Dargaud & Jaegle • Francois Freres • Louis Latour • Marcel Cadet • Marchive • Marsannay • Mercurey • Meyrieux • Remond • Rousseau • Seguin Moreau • Sirugue • Taransaud.

Most winemakers explore wood source and toasting. Winemakers have had some preference for newer wood, with proportions of new wood varying from 5% to 50%, and the bulk of the remaining wood being second-fill barrels. Overall, the choice of wood is an important decision because of the variable impact on wine aroma and flavor.[37]

Filtration

Most winemakers interviewed practice some degree of filtration. There was some debate about the merits of filtration and the potential long-term risk to the bottled wine. The major concern expressed for Pinot Noir is that the texture and aroma are easily affected and, in general, reduced processing translates into varietal preservation.

Conclusions

Progress in processing technology has been rapid.[5,6,24,26,28,30] This is a good sign for Pinot Noir producers, given the ease with which these wines lose varietal character. Developments in the gentle handling of fruit and wine will continue, and Pinot Noir producers will benefit from this.

A paper published in 2006 by John Haeger and K. Storchmann on the bottle prices of North American Pinot Noir and the factors that contributed to the prices noted the following:[20]

1) The first most important factor is climate — specifically temperature and precipitation. General temperature increases are not beneficial. In fact, the optimal climate is similar to that of Burgundy.

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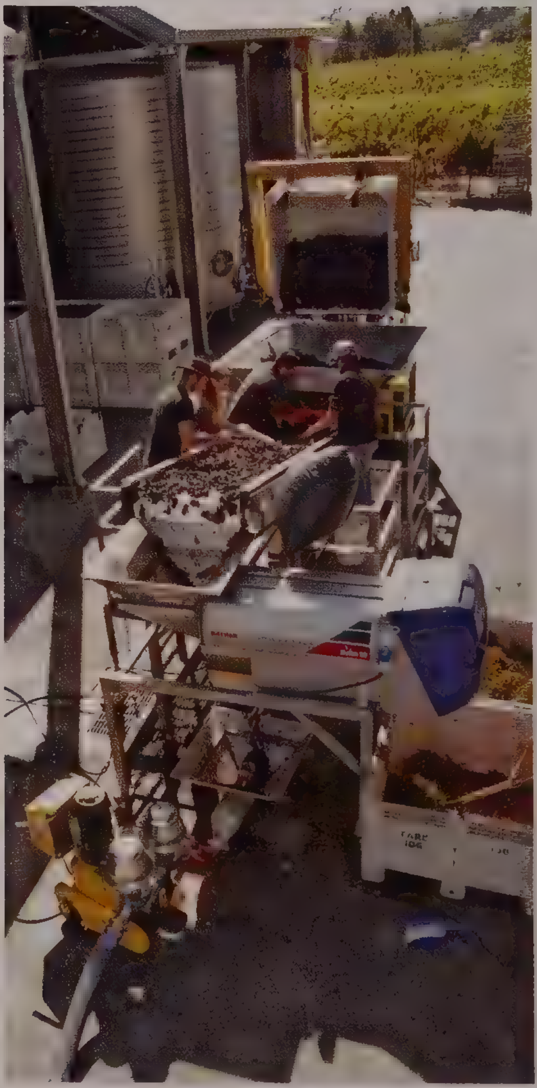
Gentle handling of Pinot Noir at Saintsbury

Saintsbury [Napa, CA] receives whole cluster Pinot Noir grapes into a hopper to feed a cluster sorting table, before destemming in a DELTA E2. The grapes fall into a hopper that feeds a Francesca F08 positive displacement rotary piston pump (115 gallons per minute), for transfer of CPN–tier grapes to a 10-ton closed top fermentor. A centrifugal pump is used for pump-over.

The Francesca is also used to transfer press wine to a settling tank, racking of wines, and barreling down. Because the Francesca has a remote control, one person can easily operate it when blending tanks. "It is a workhorse in the cellar," says Chris Kajani, assistant winemaker.



2) The second most important factor is the winemaker. His or her skill and reputation have a significant impact on prices.

In my discussions with Pinot Noir producers, these factors became readily apparent. These winemakers were very aware of the environmental conditions and status of their vines during the growing season. They were constantly experimenting both in the vineyard and winery, and had a singular passion for this variety.

Pinot Noir quality is difficult to predict and seems to present itself differently with each taste, but these producers understand and accept this. It is apparent that the best Pinot Noirs are being produced in cool climates — areas most susceptible to precipitation events.[21] As Haeger and Storchmann found, however, dedicated winemakers who are passionate about their wines are being rewarded intellectually and economically. ■

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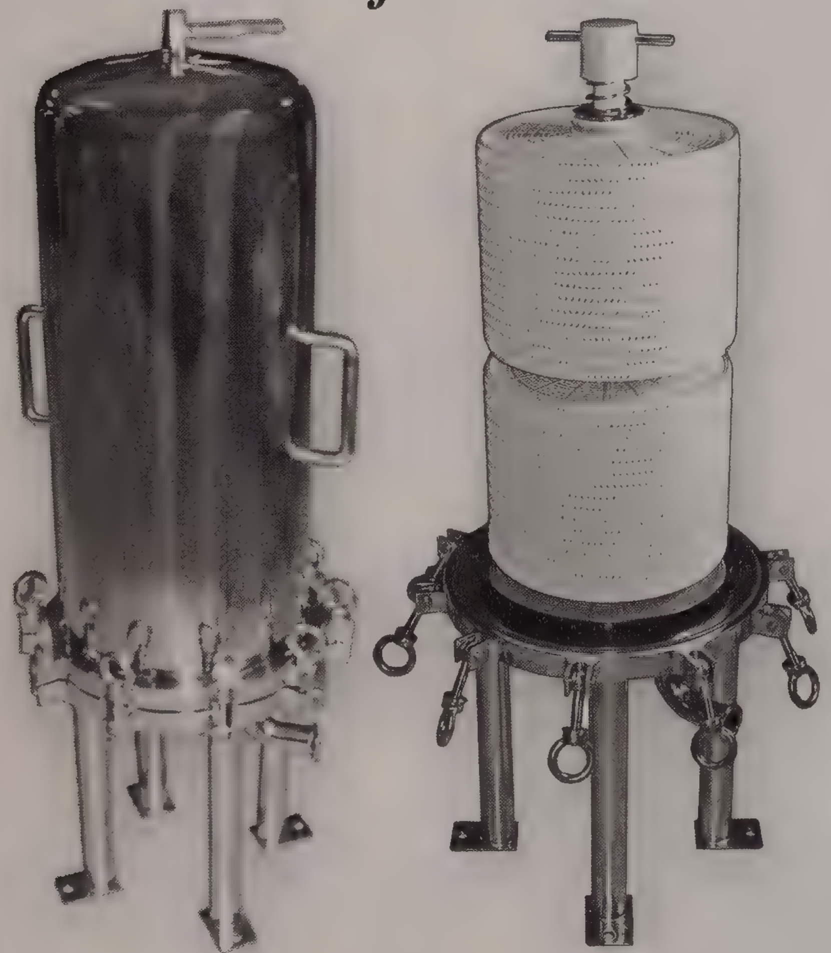

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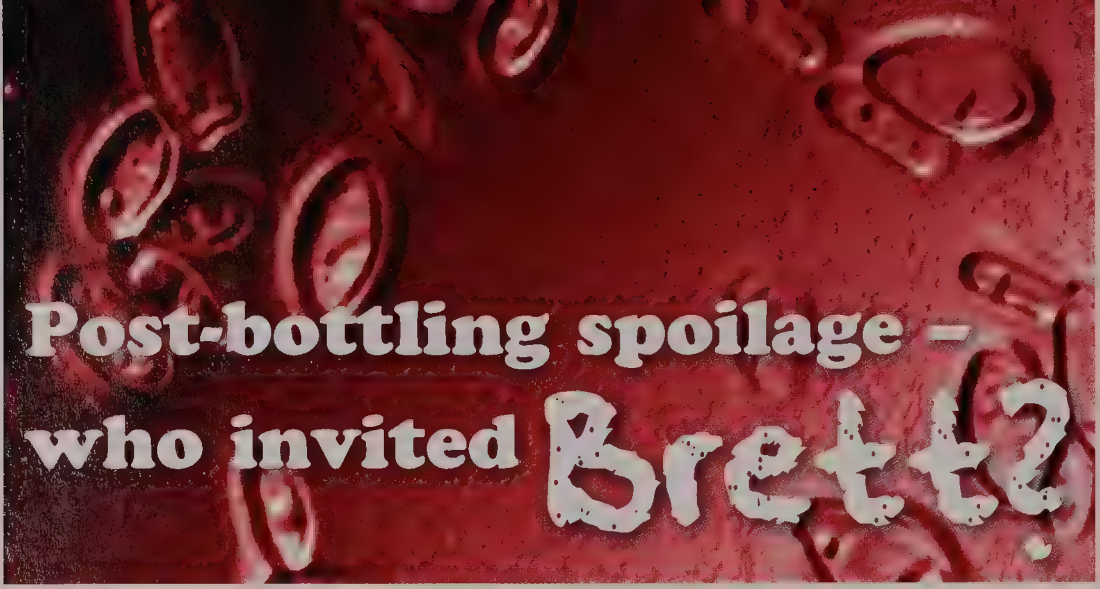

Post-bottling spoilage – who invited Brett?

BY **Adrian Coulter,**
Senior Enologist, Australian Wine Research Institute,
Adelaide, SA, Australia

Finding a red wine you have looked after, cared for, blended, nurtured through fermentation, MLF and maturation, succumb to *Brettanomyces* (*"Brett"*) yeast spoilage a few months after bottling can be very disheartening. Unfortunately, winemakers continue to confront *Brett* post-bottling, a time when they least expect to meet this unwelcome guest.

Over the past 10 years or so winemakers have become much more aware of the issue of *Brett* spoilage and most have introduced measures to control this microorganism during winemaking. The decrease in the median concentration of 4-ethylphenol (the major marker compound for *Brett*) in Australian Cabernet Sauvignon wines to a level well below perception thresholds is good evidence of this.[1]

However, over the same time period, the Winemaking and Extension Services (WES) team at the Australian Wine Research Institute (AWRI) has observed numerous wines where the concentration of 4-ethylphenol (4-EP) increased to spoilage levels after the wines were bottled.

How do we know the levels increased after bottling and that the spoilage did not just become more obvious as fruit and oak intensities decreased? Because different levels of 4-EP were found in different bottles of the same wines (which were each bottled from one tank on one day) – a phenomenon the WES team call "variable *Brett*."

The WES team defines "Variable *Brett*" as the phenomenon whereby different bottles of the same wine contain different levels of 4-EP some time after bottling.

Many investigations have been conducted into wines where it seems there has been post-bottling *Brett* growth, but it has not appeared to be variable (at the time of analysis anyway). These wines have contained high levels of 4-EP and either viable *Brett* cells (isolated during microbiological analyses), or yeast cells that appear to be *Brett* in hazes or deposits isolated from the wines.

Typically in these cases, the winemakers contacted WES to investigate the development of an "unknown sensory character/problem," or because "the character of wine has changed," or simply to "investigate possible *Brett* spoilage." In these cases, the levels of 4-EP, whilst often relatively high, have been fairly consistent and therefore they have not fallen into the variable *Brett* category.

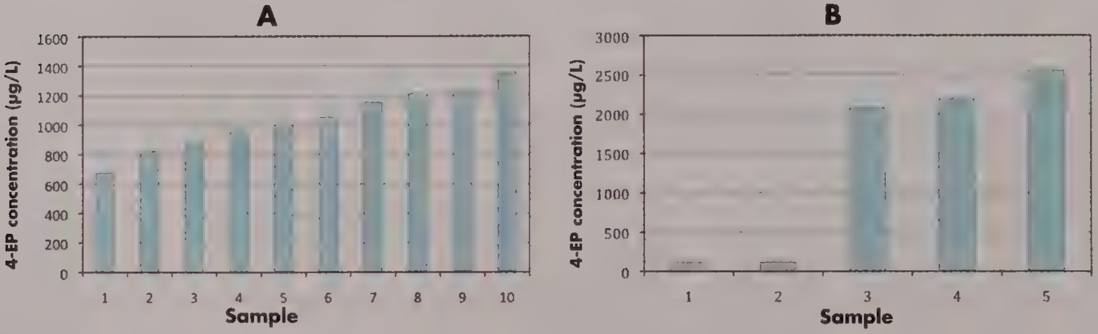

Figure 1. The two types of scenarios observed in 'variable Brett' cases: Scenario A, where a range of 4-EP levels is observed between minimum and maximum values; and Scenario B, where two groups of 4-EP levels are observed: a group with relatively low 4-EP values and a group with relatively high 4-EP values (there may be some variation in the group of samples with the high 4-EP levels).

Often in the variable *Brett* cases, the WES team were contacted to investigate wines which had been returned from overseas (including the UK, EU, U.S., and Singapore) because the importers perceived them to be faulty, or because they had received complaints about the wines. Frequently in these cases, when the winemakers looked at stocks stored in Australia, the wines were assessed to be perfectly fine. Occasionally, however, variability was in fact observed in Australian stock upon further investigation at the AWRI.

Given it was not known that the problem was variable *Brett* when the investigations, that are the subject of this report, were begun, a full set of compositional data was not necessarily obtained in each case. Depending on the initial perceptions of what the problem might have been, various tests were conducted, including sensory, microbiological, and chemical analyses.

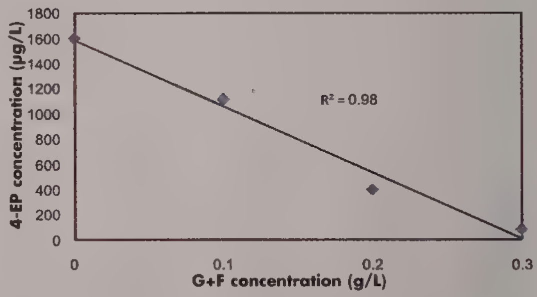

Figure 2. Relationship between the concentrations of 4-EP and G+F in different bottles of a 2001 Shiraz wine

Two typical scenarios

Whether samples of wine returned from overseas are compared to samples held locally, or whether variation is observed in samples all held in the same place, two types of scenarios typically develop:

Scenario A A range of 4-EP levels between minimum and maximum values is observed in the samples analyzed.

Scenario B Two distinct groups of samples emerge upon analysis: those with relatively low 4-EP levels and those with relatively high 4-EP levels. There is usually slight

Table I: Examples of wines where results of analyses suggested the wines were affected by 'variable *Brett*,' including the concentration of 4-ethylphenol (4-EP level), whether or not viable *Brettanomyces* yeast were observed during microbiological analysis (Viable '*Brett*' present?) and observations made during the examination of any deposit isolated (Examination of any deposit).

Wine	Comments on wine sample	4-EP level (μg/L)	Viable '*Brett*' present?	Examination of any deposit
Wine A	Stored in Australia	812	Yes	Variable morphology (ovoid to elongated) yeast (typical of *Brett*), spherical yeast, rod-shaped bacteria and coccoid bacteria.
	Returned from EU	1470	Yes	Variable morphology (ovoid to elongated) yeast (typical of *Brett*), spherical yeast, rod-shaped bacteria.
Wine B	'Low' 4-EP sample	245	Yes	—
	'High' 4-EP sample	555	Yes	
Wine C	'Low' 4-EP sample	34	No	—
	'High' 4-EP sample	1401	Yes	
Wine D	'Low' 4-EP sample	117	No	Spherical yeast, coccoid bacteria.
	'High' 4-EP sample	2550	Yes	Variable morphology (ovoid to elongated) yeast (typical of *Brett*), spherical yeast, coccoid bacteria.
Wine E	'Low' 4-EP sample	674	Yes	Variable morphology (ovoid to elongated) yeast (typical of *Brett*), apiculate yeast, rod-shaped bacteria, coccoid bacteria.
	'High' 4-EP sample	1204	Yes	Variable morphology (ovoid to elongated) yeast (typical of *Brett*), coccoid bacteria.

variation in the group of samples with the high 4-EP levels.

Examples of these two scenarios are given in Figure 1.

In Scenario A, it is assumed that all bottles of the wine contained viable *Brett* cells after bottling and that the variation in 4-EP level is likely due to either variations in starting cell numbers in the bottles, variations in storage conditions, variations in the closure (discussed further below), or

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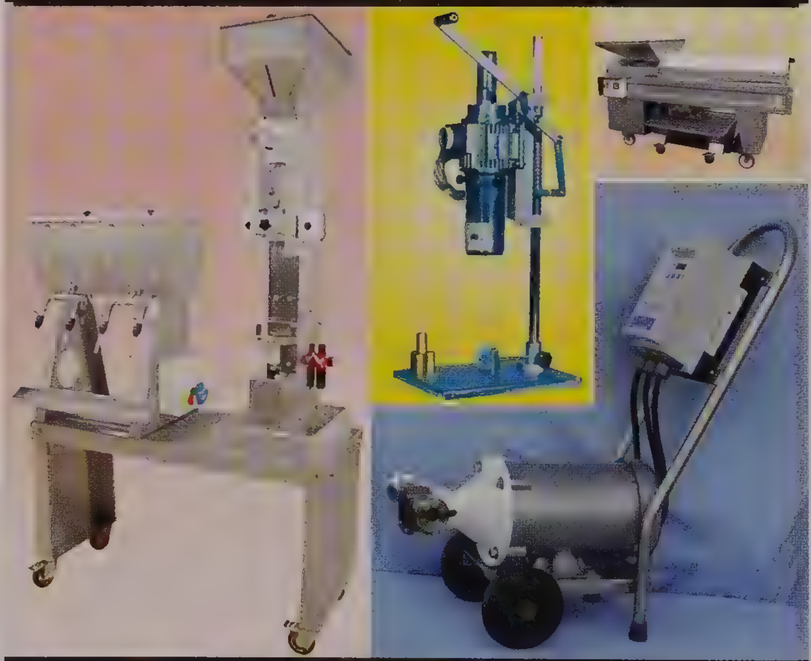

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Table II: Differences between the lowest and highest concentrations of 4-ethylphenol (4-EP) and corresponding glucose plus fructose (G+F) concentrations for five different variable *Brett* wines. The calculated amount of 4-EP produced per 100 mg of G+F assimilated (µg 4-EP/100 mg G+F) is also shown for each wine, and the average calculated for the five wines.

Wine	Comments	4-EP level (µg/L)	Difference between 4-EP levels (µg/L)	G+F level (g/L)	Difference between G+F levels (g/L)	Amount (µg) of 4-EP produced per 100mg G+F
1	Lowest 4-EP sample	87		0.7		
	Highest 4-EP sample	2050	1963	0.1	0.6	327
2	Average of group of low 4-EP samples	84		0.3		
	Highest 4-EP sample	1590	1506	nd	0.3	502
3	Average low level	455		0.9		
	Average high level	1399	944	0.6	0.3	315
4	Screw cap sample	34		0.5		
	Average of affected samples	1287	1253	0.1	0.4	313
5	Average of low 4-EP samples	792		0.1		
	Average of high 4-EP samples	1185	393	0.3	0.2	197

Average level of 4-EP (µg/L) produced per 100 mg of G+F = 331

a combination of these factors.

Observations such as the isolation of viable *Brett* cells during microbiological analyses, variable levels of glucose plus fructose (G+F) and the presence of variable morphology yeast cells (indicative of *Brett*) in deposits isolated from samples, imply the presence of viable *Brett* cells after bottling (see Table I and Figure 2).

In Scenario B, we assume that not all bottles of the wine contained viable *Brett* cells after bottling, or that if they did, they became non-viable in a portion of the bottles soon after bottling.

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Saccharomyces yeast at the AWRI, so it is not surprising to observe a similar situation involving *Brett*. This situation can arise if the wine contained very low viable cell numbers at the time of bottling, such that some bottles ended up with at least one or more cells and others ended up with no cells. Otherwise, the situation can arise through contamination of equipment at bottling, such as a portion of contaminated filler heads.

In Scenario B cases we have investigated, it is possible that there might have been greater variation in 4-EP levels earlier during storage, and that the wine was tested at the AWRI after most of the *Brett* growth, and corresponding production of 4-EP, had occurred.

Variable 4-EP levels and oxygen ingress through closures

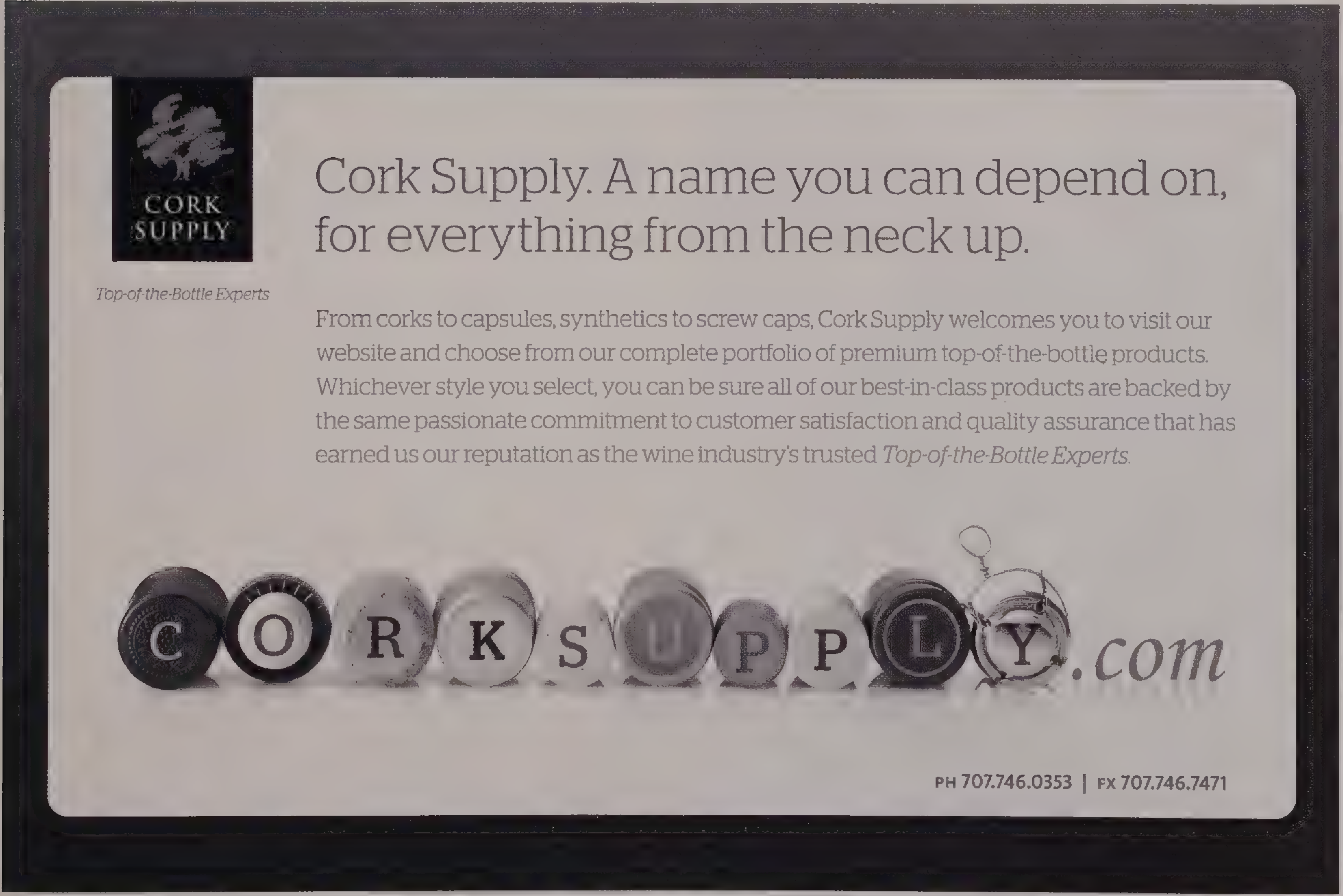
If we look at Scenario A and assume that all bottles of the wine contained viable *Brett* cells after bottling, why are there variations in 4-EP? We would expect the wine to be well-mixed and homogeneous for bottling, which should result in each bottle having the same, or similar, *Brett* cell numbers.

It is suggested that the reason is the same as the main reason why we sometimes observe different bottles of the same wine exhibiting varying degrees of oxidation after bottling. That is, variations in the amount of oxygen entering the bottles due to variations in the oxygen transfer rate (OTR) of the closures (variations in dissolved oxygen levels between bottles might also contribute to this problem in some cases). This assumes that a wine's composition (pH, alcohol level, SO_2 concentration, turbidity, etc.) is insufficiently hostile and allows the *Brett* cells to remain viable.

All cases of variable *Brett* that AWRI has investigated involved wines sealed with natural cork closures (which can have OTR values ranging from relatively low to relatively high), although in the case of one particular wine, a portion was also bottled under screw cap. The portion of wine under screw cap (which have relatively low OTR values) did not exhibit any *Brett* character and the level of 4-EP measured was relatively low.

It has been known for some time that *Brett* growth is stimulated by oxygen. For example, T. Wikén *et al.* showed that various strains of *Brett* undergoing alcoholic fermentation under anaerobic conditions were stimulated in the presence of molecular oxygen.[19] More recently, W.J. Du Toit et al. showed that the addition of oxygen to wine containing a low concentration of sulfur dioxide (SO_2) supported the survival and growth of *Brett*.[10]

We have investigated many cases of variable post-bottling oxidation, the vast majority involving cork or cork-based closures. The evidence in most cases suggests this phenomenon is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related to variations in OTR of those cork or cork-based closures, which is often exacerbated by upright storage in relatively dry conditions. E. Bartowsky and P. Henschke observed similar phenomena in various batches of red wine stored in an upright position, where variable spoilage by acetic acid bacteria was observed.[2,3]

The WES team has also observed this same phenomenon in red wine. Variable ingress of oxygen through the closures with corresponding enhancement of acetic acid bacteria growth has been hypothesised as an explanation for these observations.[2] Various authors have reported on the variation in OTR values for natural bark closures.[4,12,13,18]

It is possible the same mechanism is responsible for variable *Brett*. That is, bottles of wine sealed with closures allowing relatively larger amounts of oxygen to permeate through (those closures with relatively high OTR) are more likely to be the first to develop high 4-EP levels, if viable *Brett* cells are present, due to the stimulatory effect of oxygen.

It might also be that the amount of oxygen that permeates through closures with very low OTR is insufficient to stimulate *Brett* growth. The fact that bottles sealed with screw caps did not appear to develop *Brett* in the case mentioned above (where a particular wine was bottled under screw caps as well as corks), is consistent with this hypothesis. As in the case of variable post-bottling oxidation, upright storage under relatively dry conditions can increase the rate of oxygen permeation through cork and cork-based closures.

"Variable *Brett*" and volatile acidity

It has been reported that *Brett* can produce high levels of acetic acid,[16,17] however, this only occurs when *Brett* grows under aerobic conditions.[6] While the oxygen that might permeate through a relatively high OTR closure can stimulate *Brett* growth as discussed above, the amount is small relative to the amount required for oxidative metabolism. Therefore, it would not be expected that *Brett* would cause spoilage due to acetic acid production under post-bottling conditions.

Acetic acid was measured in approximately 60% of the variable *Brett* cases investigated (at least one low 4-EP sample and one high 4-EP sample in each case, but usually multiple bottles were tested) and no variation higher than the uncertainty in the measurement for the method was observed in the results. Even when differences of approximately 2000 µg/L of 4-EP were observed between the samples with the lowest and highest levels of 4-EP, no differences in acetic acid were observed.

How much sugar does *Brett* need?

While *Brett* growth rate is enhanced with increasing concentrations of

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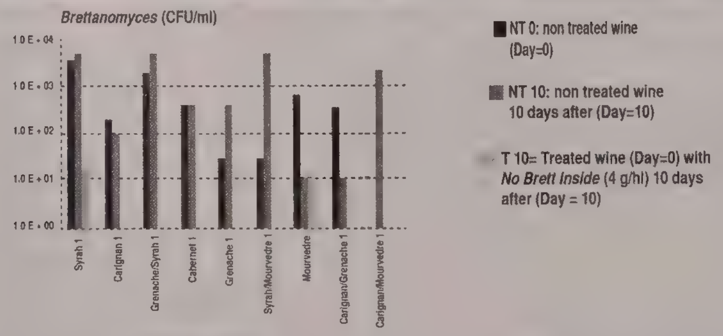

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sugar, substantial populations may develop at sugar levels of less than 2 g/L.[11] Pascal Chatonnet *et al.* indicated that utilization of 275 mg/L (0.275 g/L) of fermentable sugars by *Brett* was sufficient to produce 425 µg/L of 4-EP.[5]

In our study on the sensory perceptions of *Brett* and relationship to consumer preference, we found that increasing *Brett* character causes a significant decrease in consumer liking (104 Sydney-based red wine consumers participated in the study).[9] We also found that group (30-member sensory panel) mean aroma perception thresholds for 4-EP ranged from 368 µg/L in a "neutral" base wine, to 425 µg/L in a "green" wine, and 569 µg/L in an oaky wine[9] We can conclude, therefore, that 425 µg/L of 4-EP can have a negative impact on the quality of many wines.

As indicated above, full sets of compositional data were not always obtained during variable *Brett* investigations. However, 4-EP and glucose plus fructose (G+F) results were obtained in some cases. Using the differences between samples with the lowest and highest levels of 4-EP, and differences in the corresponding levels of G+F, we can calculate the amount of 4-EP produced per unit of G+F assimilated in these cases.

Table II shows the 4-EP and G+F data, and the calculated amount of 4-EP produced per 100 mg of G+F assimilated (µg 4-EP/100 mg G+F), for five different variable *Brett* cases. The calculated amount of 4-EP produced per 100 mg of G+F ranged from 197 µg for wine 5 to 502 µg for wine 2, with an average of 331 µg.

These calculations show that *Brett* could produce approximately 1000 µg/L of 4-EP from assimilation of approximately 300 mg/L (0.3 g/L) of G+F. That is, *Brett* can produce levels of 4-EP that are well above the sensory threshold from growth on levels of residual sugar in wines that most winemakers would consider dry.

It should be noted that *Brett* are not only capable of growth and metabolism of G+F, but can also metabolise other sugars, including galactose, trehalose,[5,14] arabinose.[16] and other sugars such as turanose, gentiobiose, and dextrin (pers. comm. C. Curtin, AWRI).

Preventing post-bottling *Brett* growth

A major factor in the prevention of post-bottling *Brett* growth is the control of this yeast during the whole winemaking process. This can be achieved by implementing a range of winemaking strategies that aim to reduce the population and proliferation of *Brett*. Areas that need to be addressed include general cleaning and sanitation, management of residual nutrients (G+F and nitrogen), sulfur dioxide and pH (these are inextricably linked), turbidity/clarification and barrel management.[8] All

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these winemaking aspects must be addressed concurrently as part of a holistic approach.

Even if your *Brett* control strategies seem to have worked and your wine is not showing any signs of being affected by *Brett*, microbiological testing should be conducted in conjunction with chemical analysis before bottling.

If chemical and microbiological analyses reveal the wine is at risk of post-bottling *Brett* growth (viable *Brett* cells and residual sugar present), then the winemaker will need to stabilize the wine by either: 1) subjecting the wine to sterile (membrane) filtration; or 2) using antimicrobial chemical additives to inhibit or kill the *Brett* cells. Note that filtration is the better and most preferred approach, whether for controlling *Brett* or any other unwanted microbial activity, and the use of chemicals should be only be considered as a backup to filtration.

Sterile filtration should be performed using 0.45 µm pore size membranes, followed by sterile bottling – it is essential that all equipment downstream from (and including) the filter assembly has been sterilized with either hot water or steam. If control strategies have not eliminated *Brett* during the winemaking and the pH and level of SO_2 in the wine at the time of bottling are inadequate to kill the *Brett* cells, then it is possible that other microorganisms such as bacteria might also be present in the wine. While membranes of 1.0 µm pore size might remove most yeast cells, 0.45 µm membranes are required to eliminate all yeast and bacteria.

Apart from SO_2, the use of antimicrobial chemical additives to control wine microorganisms is generally limited to sorbic acid or dimethyl dicarbonate (DMDC). Although sorbic acid is generally effective in controlling *Saccharomyces* sp. yeast, it has limited activity towards *Brett* and other spoilage yeasts. Sorbic acid also has little inhibitory activity towards lactic acid bacteria (LAB) and acetic acid bacteria.[11]

In fact, some LAB are able to utilize sorbic acid which results in the formation of the volatile compound 2-ethoxyhexa-3,5-diene, which has an intense geranium-like aroma.[20] This effectively eliminates the use of sorbic acid in red wine unless the wine is 0.45 µm membrane filtered and sterile bottled, and the absence of LAB is confirmed post-bottling with microbiological analysis.

While DMDC is effective at controlling low contamination rates of yeasts such as *Brett*,[15] it is not very effective against LAB and acetic acid bacteria at levels below the maximum (200 mg/L) level allowed in wine.[7] As with most antimicrobial chemical additives, the effectiveness of DMDC is dependent on the number of cells present, with higher cell counts leading to a decrease in effectiveness.

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As mentioned above, it is likely that the microbial load in a finished wine will be comprised of both yeast and bacteria. Given that DMDC is ineffective against wine bacteria, it would be preferable to sterile membrane filter a microbiologically unstable wine rather than adding DMDC. Note that we believe a properly performed sterile filtration has no detectable negative sensory effect on the product. Even if there is a slight negative effect, the benefits of filtering a microbiologically unstable wine far outweigh any negatives.

Conclusion

Post-bottling production of 4-EP can occur in wines that contain viable *Brett* cells. Even very small levels of residual sugar, levels that most winemakers would consider dry, can be utilized by *Brett* to produce levels of 4-EP that are well above the sensory threshold. It is suspected that post-bottling variable *Brett* occurs due to variations in the amount of oxygen entering bottles of wine containing viable *Brett* cells, due to variation in the oxygen transfer rate of the closure.

If microbiological analysis reveals that a wine contains viable *Brett* cells, then the wine should be subjected to sterile, 0.45 µm membrane filtration before bottling. If the wine is sterile filtered and the bottling equipment downstream from the filtration unit is sterile, then it is extremely unlikely that you will be getting any visits from unwelcome guests! ■

Acknowledgements

The author wishes to thank colleagues Geoff Cowey and Matt Holdstock for their suggestions and for critically reviewing the text. Dr. Chris Curtin is thanked for many useful discussions on the subject and for also critically reviewing the text. The work conducted by the AWRI is supported by Australia's grapegrowers and winemakers through their investment agency the Grape and Wine Research and Development Corporation with matching funds from the Australian Government. The AWRI is a member of the Wine Innovation Cluster.

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Sulfur dioxide content of wines:
Role of winemaking and carbonyl compounds

BY **Nick Jackowetz**, Graduate Research Assistant, **Erhu Li**, Graduate Research Assistant, **Ramón Mira de Orduña**, Associate Professor, Dept. of Food Science, NYS Agricultural Experiment Station, College of Agriculture and Life Science, Cornell University, Geneva, NY

Except for alcohol, sulfur dioxide (SO_2) is the only component that prompts a warning statement on wine labels, although some proteins potentially present in wine are under regulatory review as allergens in some countries. SO_2 has many useful functions in winemaking. It can serve as enzyme inhibitor in musts to prevent juice browning and oxidation, as a microbiological control agent in musts and wines, and to prevent the oxidation of finished wines.[1] It also has the ability to bind to undesirable volatile compounds, such as acetaldehyde, thus reducing their sensory impact.

Unfortunately, SO_2 also is an irritant and can have negative health effects on sensitive consumers. The U.S. Food and Drug Administration estimates that up to 1% of the U.S. population has an increased sensitivity to sulfites,[2] and other studies suggest that 5% of asthmatics may risk adverse reactions upon ingestion of SO_2.[3,4] However, it could be argued that considering its historic utilization in a number of foods the amount of health-related data available is scarce.

Our laboratory has studied the microbial metabolism of carbonyl compounds since 2000 with the aim of controlling and reducing the use of SO_2. Because of the increasing interest in low SO_2 wines, our results have been widely disseminated in scientific journals and at local and international conferences.[5,6,7,8,9,10,11,12] In this report, we provide an overview of the results and information for winemakers interested in minimizing production of these SO_2 binding compounds and final SO_2 levels in bottled wine.

Legal limits for SO_2 and consumer perceptions

Over the last five years, a number of winemakers have asked us for advice with regards to comments from customers asserting that European wines are lower in SO_2. The importance they place on SO_2 may lie in the overall negative connotations associated with its use, even though it has a long record of utilization as a preservative in a number of foods and is perfectly safe for the majority of consumers. The remarkable increase in the number of organic wineries in Europe and the steady increase in "sustainable" or "fresh" (kegged) wines with lower SO_2 concentrations in the U.S. and Canada may also be indicative of the increasing consumer interest in minimally processed wines.

Are European wines lower in SO_2? It is true that the European Union – following previous reductions – has further reduced maximum limits for total SO_2 in red and white wines to

KEY CONCEPTS

- For a given concentration of free SO_2, the total SO_2 content depends on bound SO_2 and hence, the concentration of SO_2 binders. Acetaldehyde and pyruvate are the most important SO_2 binders in most wines.
- Acetaldehyde may be formed biologically (by yeast at the start of alcoholic fermentation) and chemically (mainly after alcoholic fermentation when wines are not protected from oxidation by atmospheric oxygen).
- Yeast will degrade acetaldehyde during later stages of alcoholic fermentation if they are still viable and remain in contact with the wine. Malolactic bacteria will degrade acetaldehyde significantly during malolactic fermentation.
- All winemaking steps (racking, pumping, filtration, bottling) after the end of alcoholic or malolactic fermentation can lead to increased acetaldehyde concentration.
- Addition of SO_2 in the presence of active yeast will lead to the formation of SO_2 binders. For every 10 mg/L of SO_2 added to the must, bound SO_2 levels after alcoholic fermentation will increase by 3 to 7 mg/L.

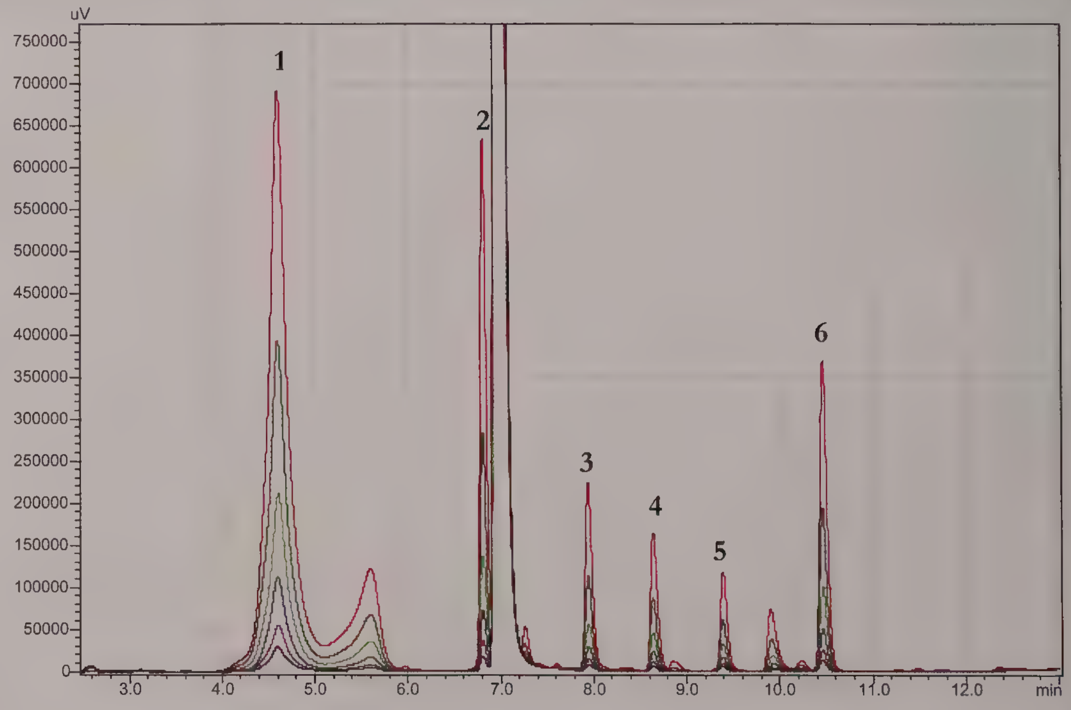

Figure 1: Chromatogram of SO_2 binding compounds. 1. glucose, 2. galacturonic acid, 3. alpha-ketoglutaric acid, 4. pyruvic acid, 5. acetoin, 6. acetaldehyde.

Box I — Legal limits for total SO_2 in major winemaking nations (in mg/L)[1]

Country	Wine type, RS	Limit	Legal Reference/Description
USA	All	350	27 CFR 4.22(b)(1)
AUS	<35 g/l sugars	250	ANZFSC 4.5.1: Clause 5(5)(a)
	>35 g/l sugars	300	
NZ	<35 g/l sugars	250[2]	
	>35 g/l sugars	400[2]	
EU	white/rosé, <5 g/l	200	EC No 606/2009, Annex I B
	red, <5 g/l sugars	150	
	white/rosé, >5 g/l	250	
	red, >5 g/l sugars	200	
	specific wines	300	Eg.: Spätlese (can be dry), Bordeaux Sup., Côtes de Bordeaux, C. de Bergerac, Navarra, Penedès, several French VdP and Hungarian and some Greek sweets
	specific wines	350	E.g.: Auslese (can be dry), sweet wines from Romania, Czech Rep., Slovakia and Slovenia
	specific wines	400	E.g.: Beerenauslese, TBA, Eiswein, French sweet wines such Sauternes, Barsac, etc., sweet Greek with >45 g/l sugars, sweet Eastern European wines
Canada	All	350[3]	Canadian Food & Drug Reg. B.02.100
India	All	450	Prevention of Food Adulteration Act & Rules, Appendix C, Table 3
Japan	All (>1% abv)	350[2]	Japan's Specifications and Standards for Food Additives
South Africa	white, <5 g/l sugars	160	Liquor Products Act 60 of 1989 Regulations Regulation 32 (Table 8)
	reds, <5 g/l sugars	150	
	All, >5 g/l sugars	200	
	specific wines	300	E.g.: noble late harvest and naturally dried

[1] Information retrieved from FIVS-Abridge database (www.fivs-abridge.com)
[2] unit is mg/kg
[3] Canada prescribes a maximum of 70 mg/L free or 350 mg/L combined SO_2

150 and 200 mg/L, respectively (EC 606/2009, Annex I B). However, these limits apply only to dry wines (less than 5 g/L of combined glucose and fructose). Numerous exemptions are listed in an additional four pages in this regulation, permitting up to 400 mg/L of total SO_2 in some wines — which is greater than the maximum of 350 mg/L allowed in any wine according to U.S. regulations (27 CFR 4.22(b)(1), see Box 1).

However, it is not particularly useful to compare the SO_2 content of dry Mediterranean wines to cool climate vintages that require some residual sugar for balance. If we compare apples with apples, we can see that in the EU whites exceeding 5 g/L of sugar may contain 250 mg/L of SO_2, Spätlese (even if dry) 300 mg/L, and Auslese even up to 350 mg/L of SO_2.

The legal framework does not support the assertion that comparable European wines contain less SO_2 than U.S. wines. In fact, there would be some evidence to the contrary, since eastern French and German winemaking regions have not been able to comply with the European SO_2 regulations in every year (See "German 2006 Vintage", Box 3).

Admittedly, while they set the legal framework, regulations do not represent *de facto* concentrations. No thorough studies comparing the SO_2 content in wines have been published. However, typical winemaking approaches and regular sensory evaluations would suggest that among cool climate wines, a good number of German wines tend to have higher SO_2 contents than local products, while French wines may be equivalent.

SO_2 binders, their occurrence in wines, and analysis

Compounds with carbonyl functions (aldehyde or keto groups) bind to SO_2. Relevant SO_2 binders in wine include glucose, acetoin, diacetyl, galacturonic, α-ketoglutaric and pyruvic acids, and acetaldehyde. A number of methods to quantify SO_2 binding compounds in wines are available.[13,14,15,16,17] Individual analysis typically is tedious and cumbersome. In our laboratory, we can

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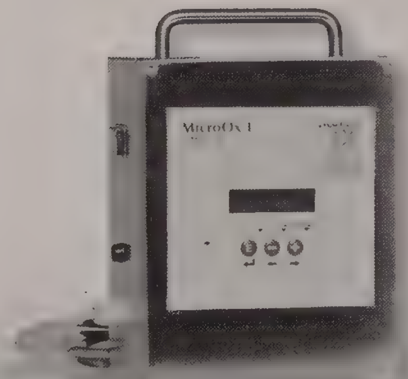

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Box II — Case Study: 2006 vintage in Germany and eastern France

This vintage was characterized by a mild spring and hot July with early ripening. A cool August followed, and by mid-September, grapes had high sugar but also unusually high acidity levels when strong rains commenced. This led to a surprisingly rapid onset of sour rot which resulted in frantic harvesting and hasty grape processing.

In the final wines, bound SO_2 levels were sky-high, and consequently Germany and Alsace had to request a 40 mg/L increase in total SO_2 maxima for the 2006 vintage, which was granted (EC 423/2008 Article 23(4) and Annex XV) as it had been for the 2000 vintage. One reason for the elevated bound SO_2 levels were high pyruvate concentrations from grapes with a high percentage of rot. However, a good part of the problem was man-made. To control the microflora, winemakers made large SO_2 additions, which led to unusually high acetaldehyde levels from yeast production. The results were significant levels of bound SO_2 (due to the pyruvate and acetaldehyde) and a high incidence of musty-moldy aromas from rotten grapes.

In order to avoid going from the frying-pan into the fire in unfavorable harvest conditions, a careful winemaking approach should be delineated early on. A thorough selection in the vineyard followed by individualized grape sorting can prevent most problems for the premium wines. Instead of massive SO_2 additions, machine harvested and sorted out fruit can be subjected to stronger juice clarification (<30 NTU), possibly combined with the addition to the must of bentonite and active carbon, for a must that is likely to develop musty-moldy aromas.

The extent of clarification should be monitored and documented by turbidimetry. Over-clarified juices should never be enriched with juice solids, which will re-create a problem. Instead, yeast hulls or microcrystalline cellulose may be used for yeast support. Flotation has proven to be an efficient, time and cooling energy-saving clarification method in such cases. Several New York State wineries have been using it successfully in recent years. Thermovinification is an interesting alternative in red wine production in difficult years (high microbial load, unripe aromas).

determine major SO_2 binders simultaneously using High Performance Liquid Chromatography (HPLC, Figure 1). However, the most important SO_2 binders — acetaldehyde, pyruvic and α-ketoglutaric acids — can also be determined with relatively low-cost enzymatic tests using a standard spectrophotometer.

In 2007-2008, we analyzed over 200 New York State wines for SO_2 binders. In reds, galacturonic and α-ketoglutaric acids were found in higher concentrations, while white wines contained more pyruvic acid and acetaldehyde (Table I).

Based on these results, we determined that the most relevant SO_2 binding compounds were acetaldehyde, pyruvic and α-ketoglutaric acids because of their binding properties and their usual concentrations in wines. Acetaldehyde typically accounts for over 80% of the bound SO_2 in wines (Figure 2) and its binding essentially is chemically irreversible. In sweet wines, glucose can bind some SO_2, although only weakly. Because of its importance for bound SO_2, we have focused specifically on understanding the formation and control of acetaldehyde during the winemaking process.

TABLE I: Average concentrations (mg/L) of several SO_2-binding compounds in New York State white and red wines. A total of 237 wines were analyzed.

Wine Type	Glucose	Galacturonic Acid	Alpha-Ketoglutarate	Pyruvate	Acetoin	Acetaldehyde
White	4750	267	31	25	10	40
Red	1400	810	74	14	11	25

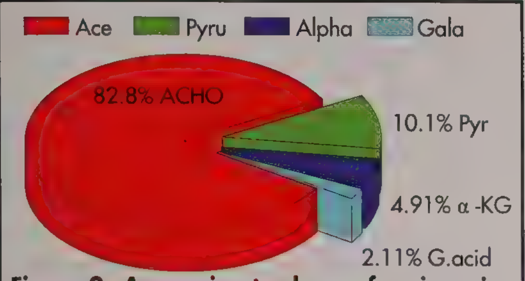

Figure 2: Approximate share of major wine carbonyls for bound SO_2 of white wines.

Acetaldehyde in wines, its role, formation, and degradation

Acetaldehyde is the most important volatile wine carbonyl and can be formed both biologically (through yeast activity) and chemically (by wine oxidation). It is a small and highly reactive molecule with a green grass, apple-like or nutty aroma. Odor thresholds for acetaldehyde vary considerably according to method and study. In wine-mimicking hydroalcoholic solutions, the

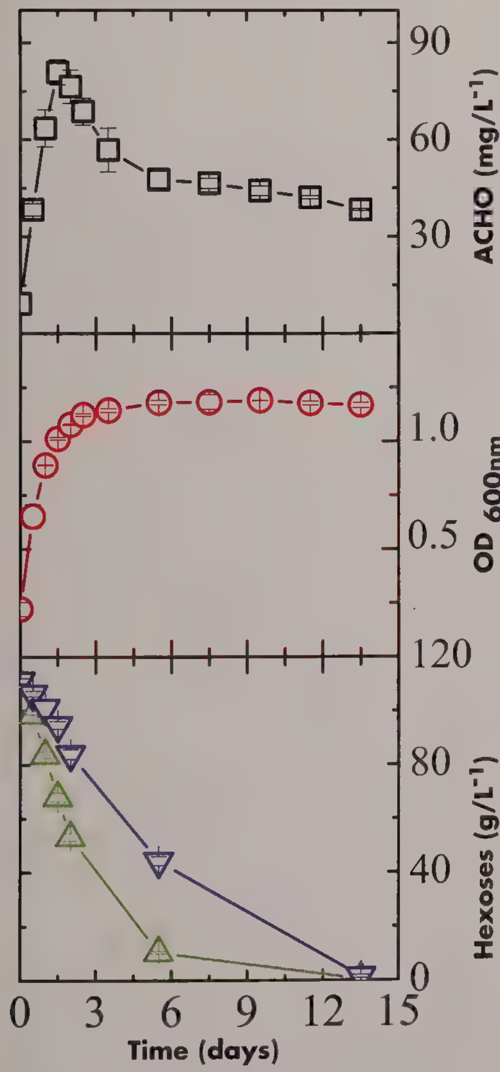

Figure 3: Formation of acetaldehyde (ACHO in mg/L) during alcoholic fermentation by *Saccharomyces cerevisiae*. □, acetaldehyde; ○, growth; △, glucose; ▽, fructose.

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odor threshold of acetaldehyde was reported as 0.5 mg/L,[18,19] and 10 mg/L.[20] In beer, the flavor threshold ranges from 5 to 50 mg/L according to beer style, [21,22] while levels of 100 to 125 mg/L have been reported for wine.[23]

Fermentation locks and tanks

After alcoholic fermentation and racking off yeast lees, wines are susceptible to oxidation and, hence, formation of acetaldehyde. Topping-up stainless steel tanks and using inert gases is optimal for post-alcoholic fermentation storage. Plastic (polypropylene and polyethylene) tanks are oxygen permeable along the inflatable rubber gasket. Some of the fermentation locks in use may not be suitable for post-alcoholic fermentation storage either, e.g., the white polypropylene locks with marbles. Any lock which does not create a tight seal (spring-loaded rubber seal with over-pressure protection) or barrier (traditional liquid filled fermentation lock) will allow oxygen ingress.

Formation – A common misconception is that the risk of acetaldehyde formation begins with the end of alcoholic fermentation, when wines may be exposed to atmospheric oxygen, leading to oxidation of ethanol to acetaldehyde in the absence of SO_2. However, unless wines are treated carelessly after alcoholic fermentation, most of the acetaldehyde found in wine actually stems from yeast activity. Enological yeast, including commercial *Saccharomyces cerevisiae,* excrete acetaldehyde during initial phases of alcoholic fermentation.[10,11,24] After reaching a peak value, acetaldehyde is then re-utilized to a certain degree (Figure 3).

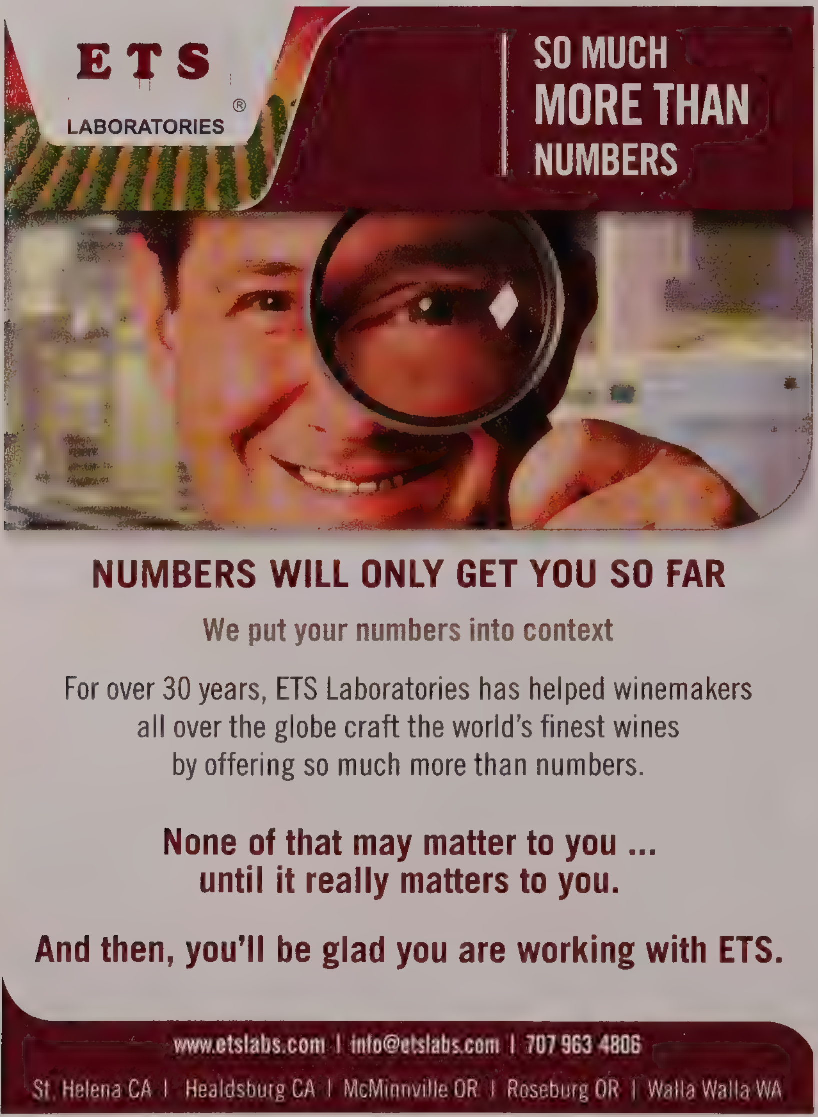
Typical residues found in Gewürztraminer and Riesling after alcoholic fermentation ranged from 22 to 49 mg/L of acetaldehyde.[11] Chemical formation of acetaldehyde relies on exposure to oxygen, the presence of transition metals such as copper and iron, and phenolics.[25,26]

Degradation – In addition to the partial re-utilization of acetaldehyde by yeast in the second half of the alcoholic fermentation (Figure 3), acetaldehyde is also degraded by lactic acid bacteria.[7,9]

During malolactic fermentation, acetaldehyde is typically degraded simultaneously with malic acid or a little later (Figure 4). If a complete degradation of acetaldehyde is desired, wines should not be stabilized until five days after malic acid depletion. Malolactic fermentation

Distillates

The formation of acetaldehyde from yeast metabolism and chemical oxidation also applies to vinification of other substrates, including production of ciders or beers ("base wines") for distillations. Distillates from high acetaldehyde beers require larger cuts, hence reducing overall yields. Limitation of SO_2 utilization, longer yeast lees contact and — where applicable — malolactic fermentation, can reduce the acetaldehyde concentration.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also leads to the substantial reduction of pyruvic acid, and partial reduction of α-ketoglutaric acid (Table II). Hence, malolactic fermentation can make a significant contribution towards achieving lower bound and total SO_2 levels.

To some degree, acetaldehyde will also be used up by chemical reactions, e.g., the polymerization of phenolics during red wine ageing.

Major factors influencing acetaldehyde residues in wines

Both biological and chemical factors are important in determining the level of acetaldehyde in wines.

BIOLOGICAL FACTORS – Acetaldehyde residues will be higher, if 1) the initial formation is increased and/or 2) re-utilization is reduced. A factor that affects initial formation is the yeast strain. *Saccharomyces cerevisiae* strains that predominate in alcoholic fermentation, regardless of whether inoculated or not, tend to produce more acetaldehyde than most non-*Saccharomyces cerevisiae* yeast. One remarkable exception in our studies was a *Schizosaccharomyces pombe* strain that was found to produce large amounts. Among *Saccharomyces cerevisiae* strains, the acetaldehyde excretion and re-utilization was not identical, but fairly uniform compared to non-*Saccharomyces cerevisiae*.[10]

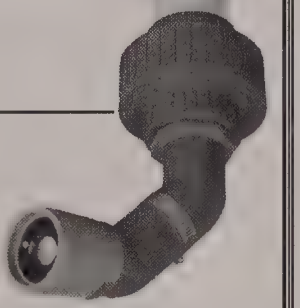
TABLE II: Percent degradation of SO_2 binding compounds by 12 strains of wine lactic acid bacteria during malolactic fermentation in Riesling (average values represented).

SO_2 Binding Compounds	% degradation
Galacturonic Acid	0
Alpha-Ketoglutarate	73
Pyruvate	87
Acetoin	20
Acetaldehyde	94

RESIDUAL SUGARS AND SO_2

Wines with residual sugar are popular in cool climates to achieve proper balance. A low-cost, rapid method for wines having reached sufficient ethanol levels is to stop alcoholic fermentation with SO_2 before depletion of sugars. However, adding SO_2 to an active fermentation will invariably lead to yeast acetaldehyde formation and higher final bound and total SO_2 levels. To avoid or reduce this increase, rapid cooling with a heat exchanger is recommended. However, if sufficient cooling energy is not available and back-sweetening with sucrose or sweet reserve is not desired, yeast flocculation and precipitation can be accelerated by addition of bentonite (20 to 50 g/hl), which can double as a partial or complete heat stability treatment.

The most important factor for biological formation of acetaldehyde is, however, addition of SO_2 to must (Figure 5). Yeast produce more acetaldehyde in response to SO_2 additions. Across several studies with more than 20 yeast strains, the addition of 1



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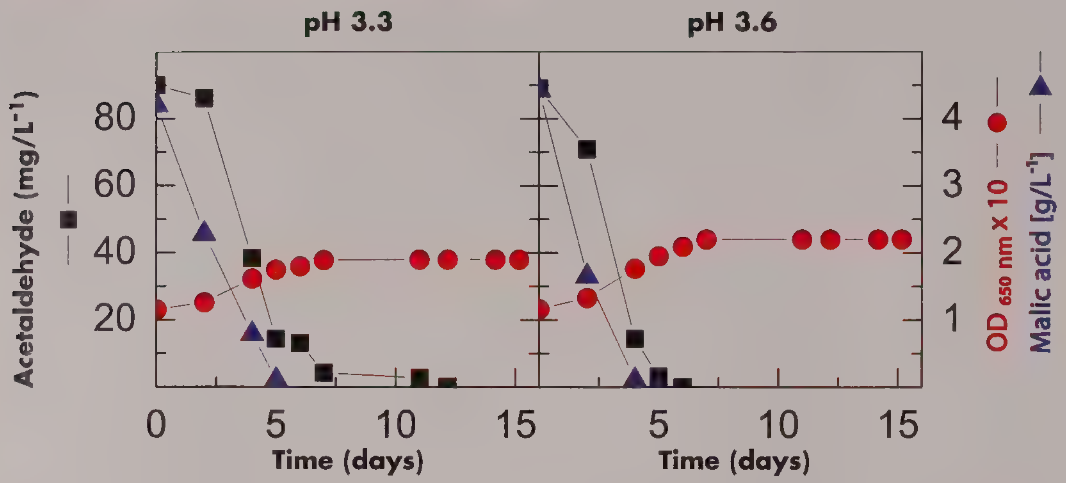

Figure 4: Degradation of malic acid (g/L) and acetaldehyde (mg/L) during malolactic fermentation by *Oenococcus oeni* at pH 3.3 and 3.6 in Chardonnay. ■, acetaldehyde; ●, growth; ▲, malic acid.

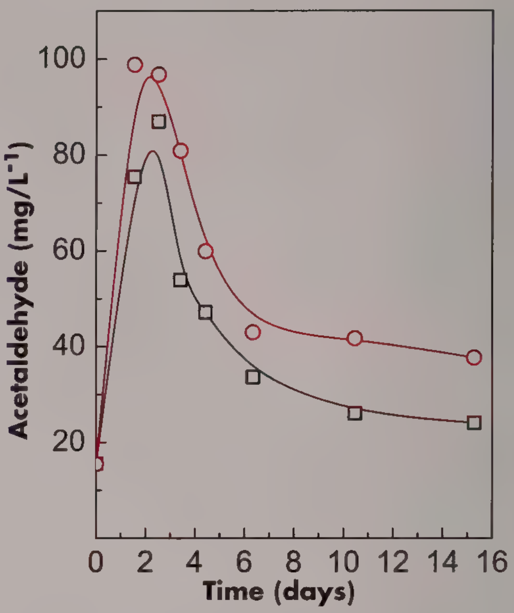

Figure 5: Acetaldehyde formation and re-utilization during alcoholic fermentation by *Saccharomyces cerevisiae* with 50 mg/L^{-1} of SO_2 added to the must before alcoholic fermentation (○) and during alcoholic fermentation with no SO_2 added (□).

mg/L of SO_2 typically increased the final acetaldehyde residue after alcoholic fermentation by 0.2 to 0.5 mg/L. Hence, a must SO_2 addition of 50 mg/L will increase final acetaldehyde concentrations by 10 to 25 mg/L and, thus increase the bound SO_2 level by 15 to 37 mg/L.[10]

With regard to re-utilization of acetaldehyde by yeast, we found that all factors that maintain a large number of viable yeast allow a better re-utilization of acetaldehyde. Accordingly, adding yeast nutrients and maintaining a moderate temperature (20°C) led to reduced acetaldehyde residues, while maintaining a cool temperature (12°C) throughout fermentation and no addition of any nutrients led to larger residues. Early racking off yeast lees or reducing the temperature

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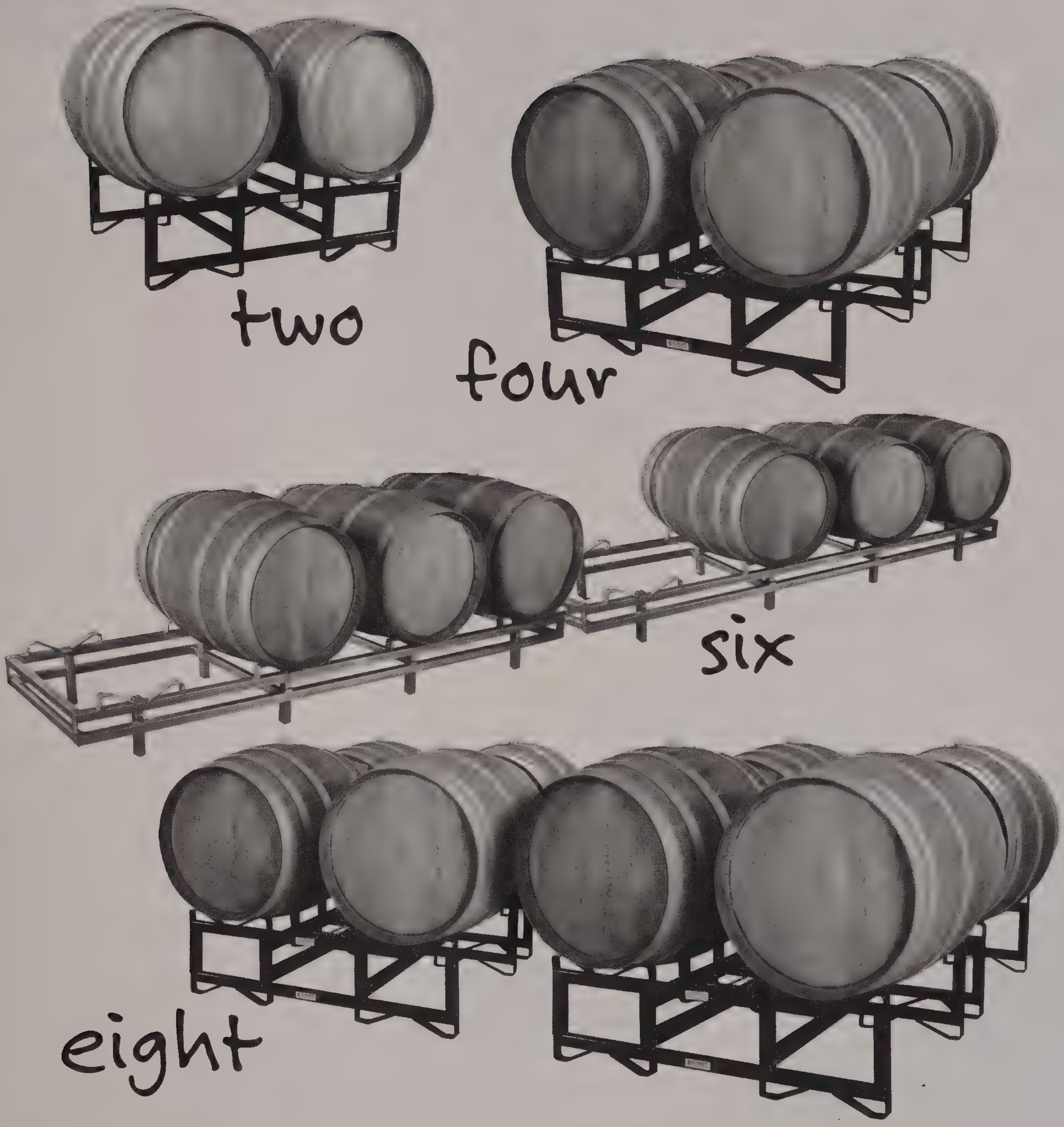

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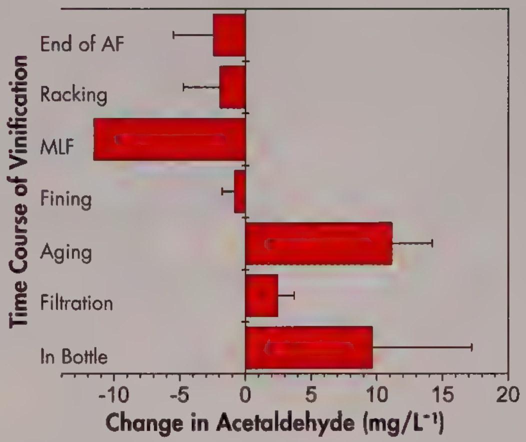

Figure 6: Data from ten New York wineries showing relative changes in acetaldehyde concentrations (mg/L) between different winemaking operations and steps.

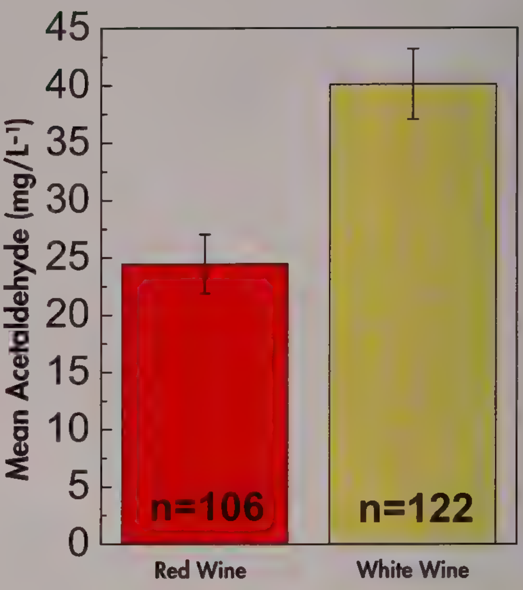

Figure 7: Average acetaldehyde concentrations (mg/L) in New York wines.

reduces acetaldehyde re-utilization and leads to higher bound SO_2 levels.[11]

Regarding the potential of malolactic fermentation to reduce acetaldehyde (and other SO_2 binders), recent results from our group show that malolactic bacteria are inhibited by bound SO_2, even in the absence of any free SO_2. In summary, large additions of SO_2 before alcoholic fermentation will result in large bound SO_2 levels, which in addition may prevent any further reduction of SO_2 binders, even by malolactic fermentation.

Chemical factors – In the last two years, we have worked with ten New York State wineries in different grape growing and wine producing regions (Finger Lakes, Lake Erie, Niagara Escarpment, Hudson Valley, and Long Island) to document formation and degradation of acetaldehyde.

Winemakers sampled their wines after important winemaking steps (after racking, transferring, bottling, etc.), froze their samples, and sent them to our laboratory for analysis. This has allowed us to identify major critical control points for acetaldehyde management.

Figure 6 shows average values obtained from this study. As long as yeast lees were present, the acetaldehyde concentration was stable or decreased slightly. Malolactic fermen-

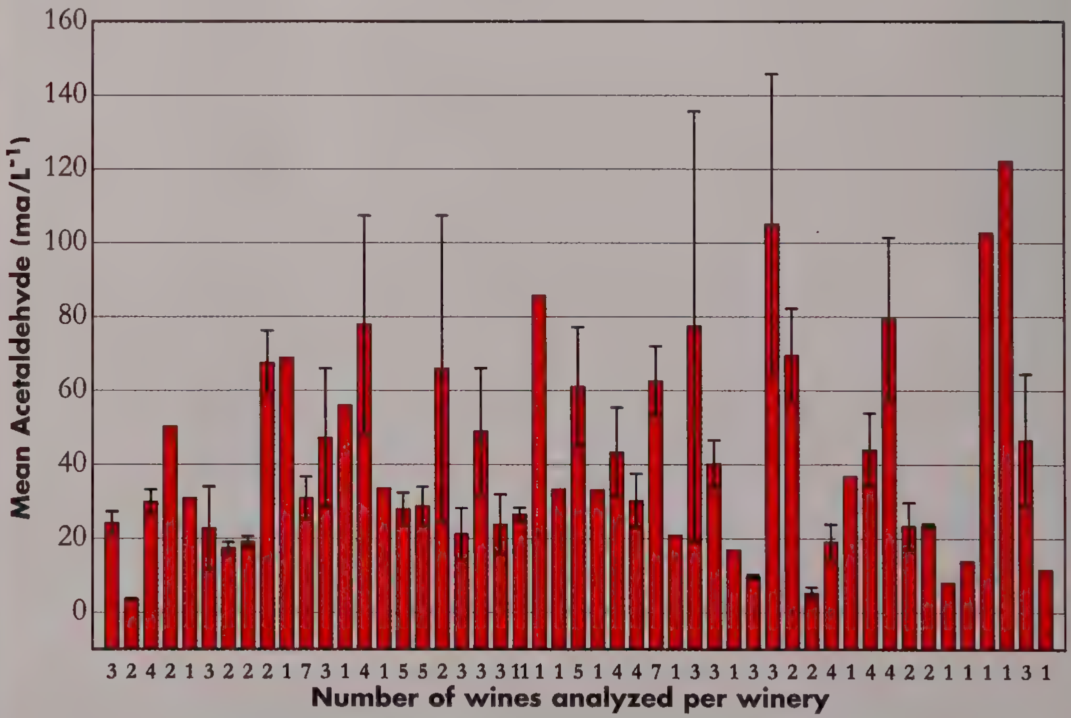

Figure 8: Average acetaldehyde concentrations (mg/L) in wines provided by individual wineries. The numbers on the x-axis indicate the number of wines analyzed per winery.

tation significantly reduced the levels of acetaldehyde. All subsequent racking, filtration, ageing, and bottling operations increased the acetaldehyde concentration again, with the increase related to the degree of success in preventing unwanted aeration of wines.

On average, acetaldehyde concentration in New York State wines were comparable with those determined in a study of wines from Ontario (Canada) several years ago. White wines had an average concentration around 40 mg/L and reds approximately half as much (Figure 7). The reason for this difference is mainly malolactic fermentation!

After wine color, the next important factor in the concentration of acetaldehyde and bound SO_2 is the winery (Figure 8). Some wineries produce wines with consistently low acetaldehyde concentrations regardless of wine color. In some instances, we find wineries with occasional outliers.

Where most wines have acetaldehyde concentrations that are significantly above average, there is opportunity for optimizing vinification decisions, reducing post-alcoholic fermentation aeration, and hence reducing total SO_2 levels. A white wine with an acetaldehyde residue of 100 mg/L would require almost 90 mg/L more SO_2 than a comparable wine from an average winery.

In the future, new methods for the reduction of SO_2 binding compounds may be available. Bordeaux researchers have patented a method that would allow the reduction of SO_2

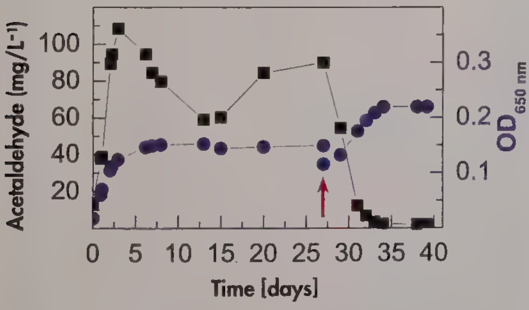

Figure 9: Typical course of the acetaldehyde concentration (mg/L) during vinification of a wine with malolactic fermentation. Blue line marks the turbidity and shows the growth of yeast and bacteria. Malolactic fermentation was induced after 24 days (indicated by arrow).

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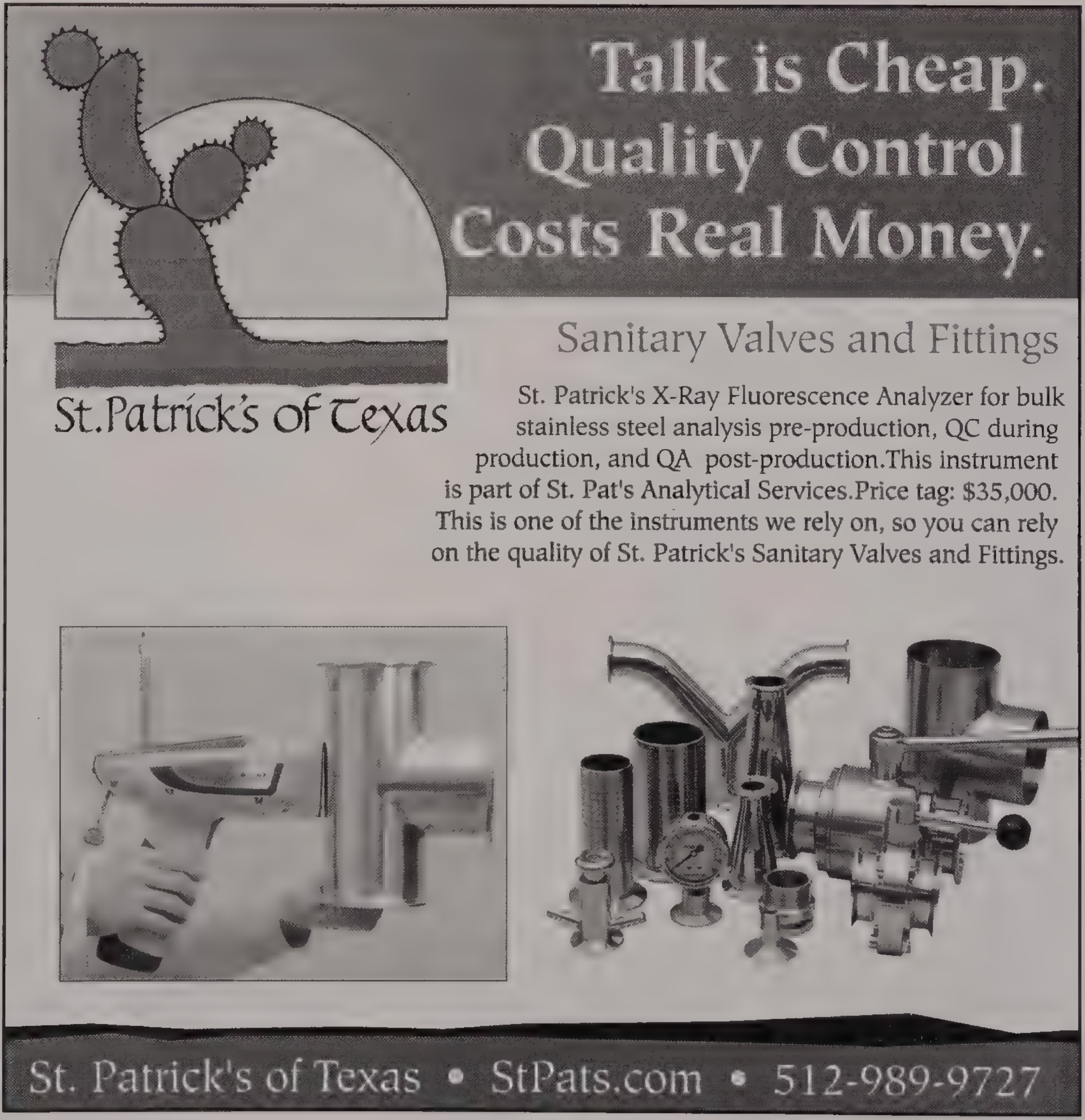
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binding carbonyls in wines using an insoluble resin. The method was especially targeted at Sauternes, which tend to suffer from high SO_2 binder concentrations. So far, the method has not been scientifically scrutinized and is not permitted.[27,28,29]

Figure 9 shows an example of the changes in acetaldehyde content during vinification. The initial biological formation by yeast is followed by a partial re-uptake. The second increase is due to involuntary chemical oxidation of ethanol. At 27 days, the wine was inoculated with bacteria to induce malolactic fermentation, which essentially removed all acetaldehyde. ■

Acknowledgements

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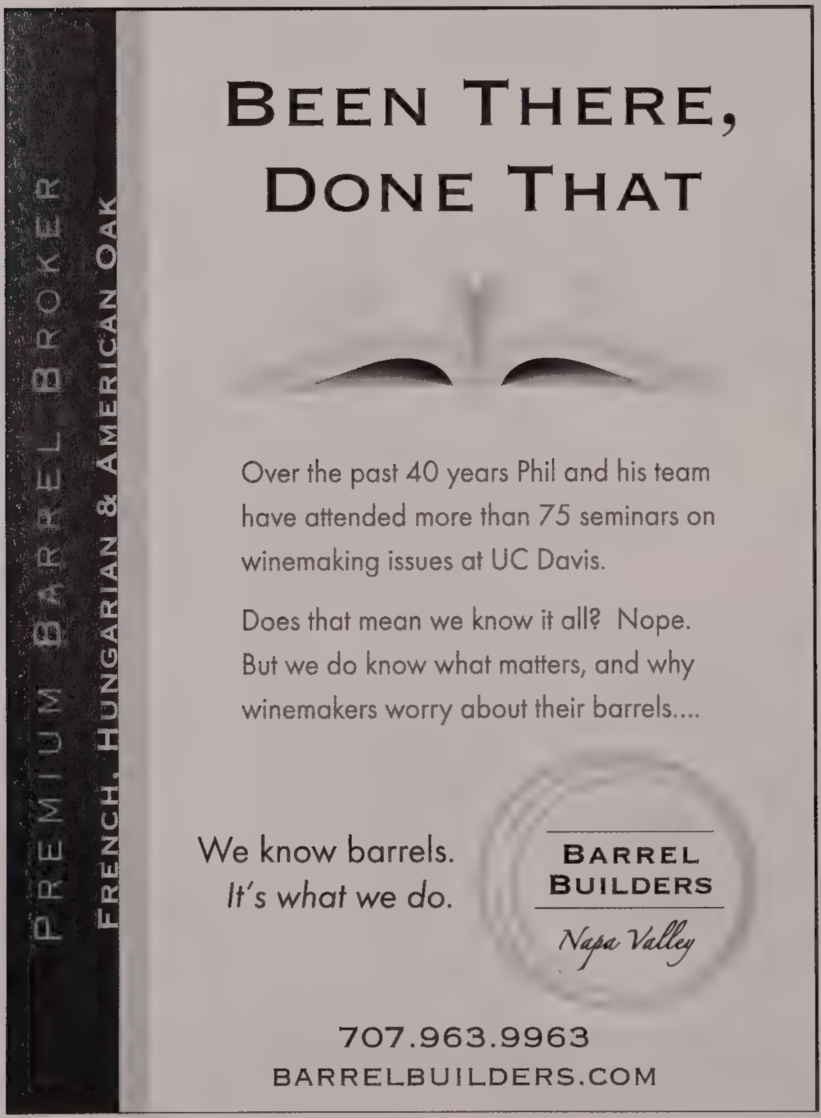
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MINERALITY

Rigorous or Romantic?

BY Jordan Ross

Describing wines in terms of minerality has come into vogue. While the descriptor is over-used and poorly defined, with each taster experiencing it differently, the sensation does exist. Even I find it impossible not to use the term when I taste white wines from the Loire Valley and Burgundy, Riesling from Alsace and Germany, and red wines from Priorat. A wine may be called "stony," "wet rock," or "chalky."

Grégoire Pissot (enologist at Cave de Lugny in Macon), offers a range of terms to describe minerality in Burgundy: "chalk, flint, salty, oil, soil, oyster shell, iodine, or smoky, like when you scrape rocks together." The problem is that these terms suggest that the source of the taste is minerals in the soil. Since plant scientists say this is invalid then what are we smelling -- or tasting? Is it something the vine produces that by coincidence tastes like rocks? Unfortunately, there is no clear scientific answer.

Popular assumptions

Mineral sensation in wine is assumed to come from minerals in the vineyard rocks and soils, which are taken up by the vine roots and make their way into the finished wine. But plant physiologists say that the minerals are not taken up by the vine roots.

When asked if minerals in the vineyard and the mineral taste in the wine are connected, geologist Alex Maltman (University of Wales, U.K.) replies "No, they can't be at least not in the direct way that is commonly supposed." Maltman is not saying minerality does not exist in wine. "The term does seem a useful tasting cue," he notes. "It is the connotation of origin that is the problem. As soon as people say minerality, they assume there are vineyard minerals in the wine. Sure there are tiny amounts of dissolved ions taken up originally through the vine roots, but these are not the same things as the geological minerals and rocks in the vineyard soil. Vine roots cannot absorb these complex geological compounds. They are largely tasteless anyway."

Disagreement on origins of minerality

Anna Katharine Mansfield (Assistant Professor of Enology at the Cornell Department of Food Science), notes the almost arbitrary use of the term. "Our problem is that we first need to have people agree on what minerality is. Some people use it as a third-tier term where minerality *is* the term. Some use it as a class of terms. Is it chalkiness, is it stoniness, is it wet rock? Is it an aroma, a taste (such as salt) or a tactile sensation?

"I have been judging on panels with Masters of Wine, sommeliers, and enologists. When someone comments 'there is really nice minerality in this wine' we have to talk about what each person means by minerality before we can agree that it is there or not there and whether it is nice or not nice. Right now it is a really trendy word. I am careful not to use the word because it is so poorly defined."

Paso Robles, California

What is a mineral?

The term "mineral" can have two meanings. Geologists talk about geological minerals, while plant scientists refer to mineral ions, also called mineral nutrients.

Geological minerals are chemical compounds; they are the minerals in vineyard rocks and soils. Mineral ions or nutrients, on the other hand, are the components of geological minerals. Vines require 16 mineral nutrients to complete their annual life cycle. For example, feldspar weathers into its component mineral elements sodium, potassium, aluminum, calcium, silicon, and oxygen.

Do grapevines take up these geological minerals, which in turn

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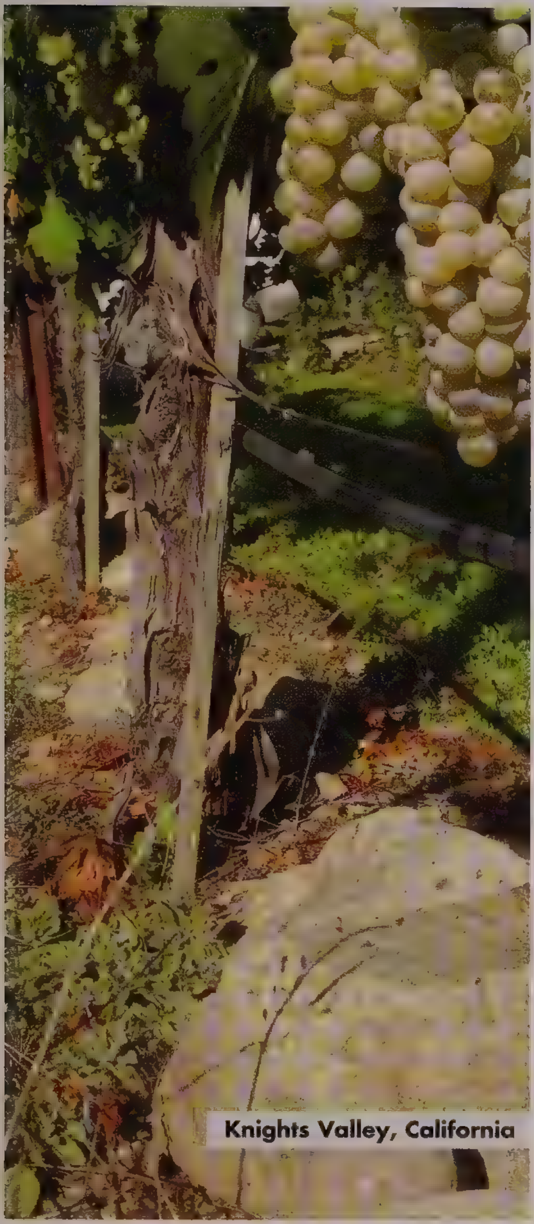

Knights Valley, California

impart a mineral character to the wine? Scientists say they do not. "The vine is unable to take up these minerals," explains Carole Meredith (Professor Emerita in the Department of Viticulture & Enology, University of California, Davis). "A mineral is a complex chemical compound and when it gets in the area near the plant roots it is broken down into its component ions. Grapevines never take up a mineral, only the components of minerals."

Although the component ions can be taken up by the roots as they are needed by the growing vine, only a certain proportion of mineral ions end up in the grape. A portion of those that *do* end up in the must are used by the yeast during fermentation. Potassium is lost as potassium bi-tartrate crystals during ageing.

Meredith adds that the plant is not just a passive filter. "What the plant puts into its fruit that eventually ends up in the wine is highly controlled. There are membranes in the roots and all throughout the vine that specifically allow some things through and exclude others. Just because a plant takes something up from the soil does not mean it gets into the fruit."

Maltman notes that the concentrations of minerals (nutrients) in wine are too low to taste. "Inorganic

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mineral elements make up only around 0.2% of a wine. In these concentrations we simply cannot taste them, even in distilled water let alone among all the aromatic organic compounds that give wines their flavor. For example, copper is typically present in concentrations of 1.5mg/l. Its taste threshold in water is 3 mg/l. So for us to taste copper, the concentration in water would have to be 2,000 times greater and massively more in wine."

What are we tasting or smelling or feeling?

Tasters often define minerality as the smell of wet rocks following a summer rain. But rocks do not have an odor, so what are we smelling? According to a paper written by Australians J. Bear and R. G. Thomas in 1964, after a rain what is assumed to be the smell of rocks is *petrichor* --- the scent of organic compounds that were released from plants and fell on the rocks and soil during dry periods.

Mansfield explains, "The authors suggested that when it rains, volatiles contained in the dried plant material are released, so what you are smelling is not the rock itself but a compendium of all the plant life around those rocks which is kind of an interesting argument for *terroir*. You are only smelling organic matter that has settled on the rock; if you get a really clean rock it does not have a smell. The authors called this rock aroma or rock essence *petrichor*, and it would vary based on the kind of plants around the rocks."

Gavin Sacks (Assistant Professor of Enology at Cornell) makes an important clarification: "A rock and a mineral are not the same thing. A mineral is an ordered solid with a well-defined chemical structure. A rock is composed of one or more minerals, but may also include organic matter think about oil shale, as an extreme. Usually we encounter rocks in nature, not minerals. Rocks could certainly have a smell; it is just not the mineral part we are smelling."

Where do you find it?

Christophe Rolland (ex-sommelier at the Bellagio in Las Vegas, Alain Ducasse in Monte Carlo, and L'Auberge de l'Ill in Alsace) finds minerality in wines from the most northern vineyards where you have a single grape variety. "In regions such as Alsace and Burgundy, the soil has a tremendous impact on wine character. In Champagne, especially with Chardonnay, you also have tremendous mineral quality. The carbonation I think brings this quality out. But you have to work with a small grower who works in a particular area or with a négociant who works with a specific area. Champagne is harvested at low maturity and high acidity, which works in favor of minerality."

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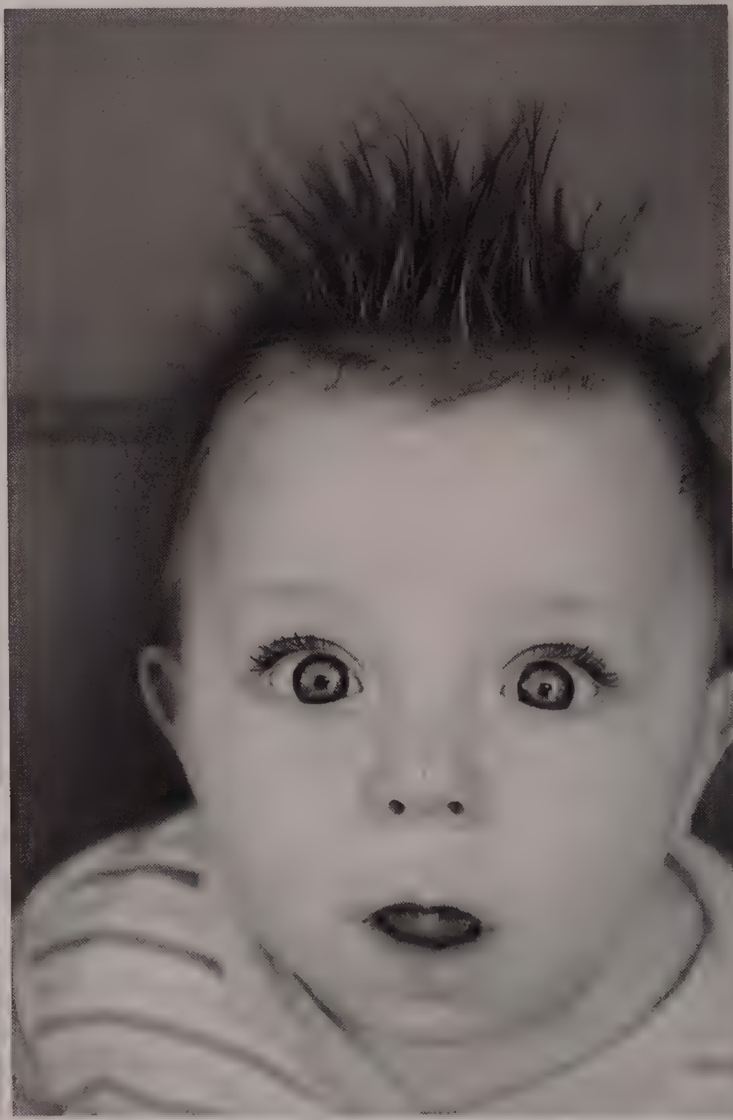

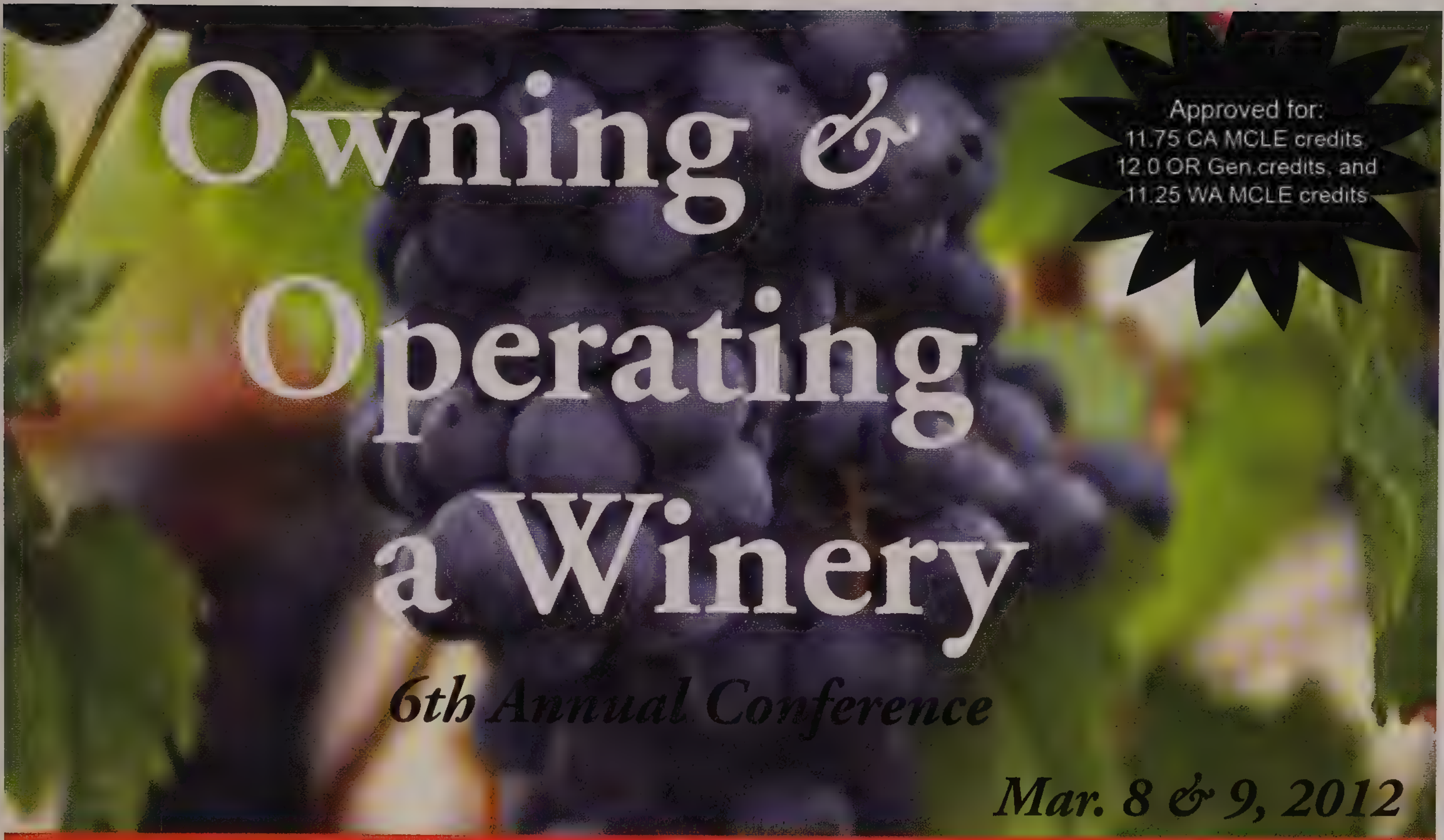

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Link to acidity

Rolland mentions the one point where there is agreement -- the relationship between acidity and minerality. High acidity is one of the necessary conditions for the expression of minerality. "I think the acidity reinforces the minerality. High acid vintage like 1996 or 2002 in Burgundy provide more support for the minerals. Minerality can be fragile. When you do lees stirring, you try to enrich the wine, but you lose some of the vivid, crisp, pungent character that provides that edge, which is more in phase with the minerality of the wine and less with the buttery, rich, waxy, honey character."

Pissot concurs, adding that the term "mineral" is, at times, used when "acid" would be more appropriate. "In my opinion, the mineral flavor is indeed linked to the level of acidity. All the vineyards mentioned are in northern Europe, with colder climate, therefore with sometimes under-ripe vintages. This is why the 'mineral' quality is sometimes misused by people, describing a wine as 'mineral' instead of under-ripe, or 'acid,' in order to improve the description of the wine."

Mansfield says that the relationship between acidity and mineral flavor is "a good hypothesis, but just a theory at this point; some suggest that it is a combination of a lack of fruitiness and high acidity."

Rainer Lingenfelder (Germany's Pfalz region) says, "It certainly has nothing to do with what one can measure as potassium, calcium, magnesium, boron, or whatever in the wine. It probably has more to do with acidity and actually a certain 'un-ripeness.' People find minerality in our wines, more in the ones with higher acidity. I myself … use the term very rarely, as it is much less apparent in our conditions (and soils: sand, loess, and chalk ?? … is there some connection to the soil after all?? Well, I guess our sites just produce ripe fruit on a regular basis.

"The grape variety also makes a difference. It is true that Riesling shows more minerality than Scheurebe even when they grow side by side. Riesling has more acidity than Scheurebe - this is probably the reason. I find more 'minerality' in Saar wines than in Rheinhessen or in Pfalz where I am from."

Nik Weis (who runs the Mosel estate of St. Urbans-Hof) concurs. "Especially when acidity is part of the game, minerality comes out more. My Ockfener Bockstein located in the Saar is a higher acidity wine and shows more minerality than my Piesporter Goldtröpfchen. The Ockfener Bockstein is embedded in a mountain range. At night the cool air flows from the mountain down into the valley. The Piesporter Goldtröpfchen does not have that kind of a chilling effect; it is always fairly warm.

"In addition to these climatic temperature differences, the two vineyards have different soil composition, which affects the amount of heat the vines receive. The soil in the Piesporter Goldtröpfchen is a highly decomposed dark blue Devon slate, which makes it heat up easily. The soft and waxy structure retains the warmth long into the evening. In the Ockfener Bockstein you find a grey slate soil with very hard and solid rocks, which also have some quartz enclosures. The acidity is more preserved here than in Piesport."

Mineral expression appears to come less from the soil's mineral composition and more from the climate and how the soil's physical characteristics influence ripeness and therefore acidity.

Meredith agrees with the acidity thesis, "Minerality is probably related to the perception of tartness. Lean, tart wines have this. Why people call that 'mineral' is probably just convention and may not have anything to do with real minerals at all because I do not think people have a clear idea what minerals taste like."

Mineral character is most frequently cited in wines grown in limestone-rich soils; as if the chalky sensation one finds in Chablis or Riesling in Alsace is derived directly from the soil. In reality, limestone soils are alkaline and produce wines with higher acidity, explains Marc

Dubernet (who has a doctorate in enology and has managed Laboratoire Dubernet in Narbonne, France for 40 years). "The favorable terroirs for the appearance of minerality are those that bring together a cool climate with a good late growing season and alkaline soil types (chalk, limestone, etc.). It is well-known that, for any given climate, alkaline soils lead to high acidity and low pH in wine, while acidic soils lead to must with lower acidity and higher pH."

Dubernet adds that while the acidity level is important, the balance of organic acids in wine is fundamental. "It is clear that malic acid plays an important role. Its taste is decidedly more 'mineral' than that of tartaric acid. A higher amount of malic acid at harvest time will always be a favorable factor for minerality."

Is minerality a taste?

Weis describes minerality as less of an aromatic and more of a taste quality. "Minerality is not something that you smell. It is much more a salty impression that has an effect on the way the acidity comes along or the sweetness. I describe minerality in terms of saltiness, when a wine has a salty finish just like some mineral waters do. The salty characteristic is always derived from minerals in the soil.

"For example, when you talk about chalky minerality that would be something you would find in a Chablis or a white wine from the Cote d'Or, whereas in the Mosel we have a kind of ashy minerality which definitely comes from the slate soil. I think that the minerality in the Saar, where I am from, comes through in a different way, maybe even stronger, and the reason for that is the mostly hard gray slate soil with quartz and some iron veins. In some parts of the Saar there is so much iron that the slate has a reddish color, a rusty red."

Is minerality a mouthfeel sensation?

Weis adds, "Even more so it influences the mouthfeel of a wine. The minerals in Mosel Riesling allow us to leave more sugar in the wine to balance out the acidity and it still finishes dry." The sweetness is offset by the saltiness the margarita effect. The salt around the rim of the glass is important; the acidity of the lemon or lime and sweetness alone would make it taste just sweet and sour. The salt creates a feel of effervescence, a feel of refreshing spritz."

Determining whether minerality is a taste, smell, or mouthfeel sensation may prove to be more difficult than one would think. Dr. Larry Marks (Fellow of the John B. Pierce Laboratory and Professor of Epidemiology and Psychology at Yale University) explains, "When you take

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something into your mouth you try to figure out what part of it might be smell; that is very hard to do, even with practice.

"If you take something fairly simple, vanillin, the essence of vanilla, at low concentrations, even though it does not stimulate taste receptors at all, people will put it in their mouth and say, 'Gee -- it tastes a little sweet,' even though there is no activation of sweet receptors. You put in a little sugar and they say, 'That is a really good sweet vanilla taste.' They cannot determine which part of it is taste.

"The flavor of anything taken through the mouth has an enormous number of components. It is a complicated and poorly understood interaction among gustatory response (taste), olfactory response (smell), and somatosensory response (touch, mouthfeel). You want to tease these apart but you cannot do it just by reflecting on your experience. If we could do that we would never have had to build laboratories, and even with laboratories it is hard to figure out."

Where does minerality come from? Do chalk, flint, or slate soils impart chalky, earthy, flinty, gravelly, or slatey characters to a wine? Meredith believes the origin of minerality is more complicated. "It is something that the plant is doing in response to its total environment, which will include the soil, but also the air and the temperature and the wind and how it is farmed. The plant ends up producing the things that you taste; it is not just transferring them from the soil into the wine. You have to give the plant more credit; it is not just a passive conduit for the things in the soil."

Weis believes mineral flavors come from constituents in the soil, "I do think that minerality comes from the soil. These minerals influence the metabolism of the yeasts and therefore the fermentation flavors in a wine."

Maltman suspects that although the concentrations of inorganic ions derived from the vineyard soils are tiny, they might influence organic chemical reactions involved in vine growth and during vinification. "It could be some combination of the resulting organic compounds rather than the ions themselves that give what people call a minerality taste," he suggests. "In other words, there could be a connection between the vineyard geology and minerality, but in a way that is very indirect and complex - and at present unknown."

"There is an absence of hard data showing that what we call 'minerality' correlates to certain levels of specific minerals or ratios between minerals, or perhaps even in specific redox couples," says Randall Grahm (Bonny Doon Vineyard, Santa Cruz, CA). "Probably the disulfide/thiol couple is the one that is most interesting, as that is the one that is in our sensory wheelhouse." Here Grahm is touching on an interesting idea: that reduction can show itself in a form that leads to the use of the "mineralic" descriptor by tasters. Overall, he thinks that minerality in wine has many sources, and that it correlates with this list of phenomena:

1) Mineral-rich soil, that is, high levels of exchangeable cations,

2) Healthy soil microflora,

3) Low yields, that is, a favorable ratio of rooting mass to fruit volume,

4) Old vines,

5) Non-irrigated soil, especially soil that is not drip-irrigated,

6) Maybe smaller trunk diameter and head-trained (*gobelet*) vines (bush vines),

7) Later-harvested vines (all things being equal), but not over-ripe grapes,

8) Ability of wine to tolerate oxidative challenge after bottle being open for several days,

9) Ability of wine to age and improve in the bottle,

10) Mineralizing processes in soil - the presence of particular animals (sheep), manure, compost.

"It is certainly possible to confute 'minerality' with other phenomena," adds Grahm, such as "the presence

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of *Brettanomyces* (that is more iodine and sweat), 'greenness' (that is likely green seeds or perhaps inclusion of stems), tannin (that is more of a sense of astringency), and various volatile sulfur compounds such as thiols and disulfides." In relation to the last point, he adds a question: "Do minerals in wine tend to make a wine more backward or 'reduced,' or is a tendency toward the formation of thiols just another word for minerality?"

Conclusion

The lexicon of wine is full of abstract terms that are hard to define. What is a "layer" of flavor? What exactly is a wine's "mid-palate?" It is ok for scientific fact and romance to comingle? But minerality is important and different. As a major component of some of the world's greatest white wines; it has become a code word for high quality.

Its popularity could be a backlash against the big, oaky, buttery style. As wine drinkers become more sophisticated, they are attracted to wines that reflect a place rather than the hand of the winemaker. Minerality is one way to associate a wine with the vineyard or region in which the grapes are grown.

Since how a wine tastes is a combination of so many factors, some of which are impossible to measure, we look for something tangible, like rocks, to explain what makes a wine distinct. It is easy to oversimplify and draw the wrong conclusion. Rocks, rather than directly imparting flavor, play a more important role in a soil's physical structure, which affects how water is made available to the vine.

Minerality is an actual sensation, but whether it has anything to do with minerals in the real world is doubtful. It is a bit of an abstraction - part romance, part reality, a moving target, different from region to region and even within a region.

Arnaud Saget (who produces Domaine de la Perrière Sancerre and wines from nearly all Loire Valley appellations) feels that Pouilly, Sancerre, and Savennières are the three dry appellations that show the best expression of minerality; but not the same minerality. Saget explains, "Each appellation expresses minerality in different ways. While Pouilly gives more impression of 'crunching' on a rock, Sancerre shows more elegance and more purity. Savennières sometimes shows an expression of minerality very close to some Rieslings from Alsace, with petroleum aromas."

Minerality probably does not describe a specific sensation but a class or category of sensations found in wines with high acidity and low fruit expression; although the fruit-scented German Rieslings are an exception to that rule. Because it has become associated with high quality, we tend to look for it.

Since so much of perception is based on expectations, we tend to find minerality where we think it should be. The next time you open an austere white wine with high acidity, choose your words carefully. ■

Jordan Ross is a graduate of the Department of Enology & Viticulture, University of California, Davis. To view his previous articles go to www.Enologyinternational.com. Ross works for Pasternak Wine Imports in Harrison, NY.

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2011 WINE INDUSTRY CEO SURVEY

Responding to change in the unknown global environment

BY **Robert Smiley, PhD,**
Director of Wine Studies, Dean and Professor of Management, Emeritus, Graduate School of Management, University of California, Davis
Gabriel Froymovich, Graduate Research Assistant

Thirty members of the U.S. wine industry answered five questions in the 2011 trends survey compiled by the Wine Industry Financial Symposium Group® and the U.C. Davis Graduate School of Management. Participants included representatives from grape growers, wineries, distributors, and brokers. Each survey question is followed by replies and concludes with a summary.

Q: *Are supply of and demand for grapes in balance in 2011? Will they be in balance for the next few years?*

- It is hard to forecast, but our predictions show that there will be tight supply for three or four years for all domestic wine. The situation remains different internationally, but as long as the dollar remains weak, we anticipate that domestic wines will still dominate the U.S. market.
- You cannot find any grapes today, because there are none to buy. Most of the big guys have a standing order to buy anything extra. The 2011 crop, in our opinion, was probably 10% shorter than people expected.
- California grape growers have been reluctant to plant in the last few years, and we are starting to see the impact of that. The market has recently tightened up substantially. People are guardedly optimistic about where the marketplace is going. Theoretically, we have been out of this recession for two years, even though it does not feel much like it. Domestic supply in coastal areas is tight to demand, for sure.
- The need to replant after phylloxera will be hitting us in a decade or so. There was a significant acreage replanted last time phylloxera broke out. There could be a significant amount that is coming out of the ground that needs to be replanted now, and that could raise havoc with the Napa Valley supply.
- In the Central Valley, commodity crops like corn are getting very profitable, with limited input costs and no depreciation. To plant a vineyard in the Central Valley used to cost $5,000 per acre, but it is now $15,000. You need a bank to say yes. Many vineyards that went into the ground 30 years ago are running out of their productive life. Big question is: "What are the growers going to do when these vines get ripped out?" There are more profitable options than there were decades ago when those vines went in.
- There was a horrible freeze here in Paso Robles during the spring of 2011, and we lost 50% of our Cabernet Sauvignon. Before that freeze, our grape varieties were pretty much in balance. There was freeze damage in the Delta, too, and the further north you go, the lighter the crop is. The 2011 crop was expected to be light statewide, and less than demand. Prices are going to be picking up. Then there was the June weather, which led to uneven set. Demand is greater than the supply right now.
- In 2010, it was easier to buy grapes, but that has changed a lot now. You can tell by looking at the bulk wine market — prices have all moved up quite smartly. The general trend was more people thinking they were going to need grapes, so the market was getting a bit tighter, especially with the weather this year. The supply of white grapes on the valley floor — like Sauvignon Blanc and Chardonnay — has probably been hit the hardest, but we are worried about Cabernet, too.
- We are looking at shortages more than surpluses in the future. In the roughly 14-year cycles of the wine business, there are two points of balance that each last for about 15 minutes. We are going to skirt right through balance, especially at the value end. At the luxury end, there will be demand for the grapes, but it may not be all at sustainable prices, or what some might have planned for the price to be.

GRAPE SUPPLY & DEMAND SUMMARY

- 2011 was very tight due to weather events, maybe even tighter than many had predicted.
- Due to a lack of planting plus growing demand, the next few years will likely continue to be tight, though it should be easier to get grapes than it was in 2011, as long as Mother Nature cooperates.
- Look out for the need to replant in the long-term. Vines going into the ground may only be enough to replace those being pulled out.

Q: *Has discounting ended? Will it continue?*

DISCOUNTING IS HERE TO STAY

- Discounting is not going to end. We expected it to continue it through the holidays, and then we are going to look at it again in Spring 2012. I do not know what will happen then, but I am planning on not only reducing some of that programming, but on taking some price increases. We cannot hold on any longer.
- There is always going to be discounting, because of people who are out of balance or wanting to buy market share.
- Major retailers use price as a primary tool to attract consumers into the store. Who do you think is paying for that? We now have some room to move pricing up for some brands and some varieties, but my trade spend budget is not going down next year.
- We are optimistically coming out of this great recession, but people still enjoy a deep discount possibility, whether it is an automobile or a bottle of wine. Discounting is still going on, unfortunately. Is this the new normal? It might be. It has to turn at some point, but not until the economy comes back,

and that is going to be a while.

- Discounting is not going away. It is another tool for wineries to use now that it is out of the closet, so to speak. Although we have all seen discounting as a threat, it is not going away, regardless of pricing or the market, because customers now demand it.

- I never thought that discounting was going to be over in 2011. It will not be over in the next several years. Discounting is part of the game for a while. The biggest thing I have noticed is that the recession recovery has been really inconsistent. We will have a really good month or two, and then a soft month.

The other question is, "What price point do you live at?" If you are living where consumers traded down to, you did not have to discount as much. If you were living at a higher price point, then you did have to discount back. Consumers are looking for value and I see their resistance to going back up to $20, $40, and $50 bottles. They are coming back, but slowly. People are not, overnight, deciding to start filling their cellars again.

THERE IS LIGHT AT THE END OF THE TUNNEL

- Some of the other brands are still working off inventory, doing deals that cause the market to resist, because there are always customers who say, "If you won't give me a deal, then I'll go to someone else." It will take a little while, but pricing is certainly starting to change. We will get back to the good times.

- Discounting has not stopped, though we have pulled back quite a bit. We actually raised the price of our Cabernet and cut back on its discounts. We were able to do that was because we had a short-crop vintage of Cabernet, so no need to grow our Cabernet business.

- Discounting certainly has not ended, but I anticipate that the amount of discounting will be reduced, given the supply-demand balance of the current marketplace. That will happen in 2012.

- Everybody is optimistic that prices will start to firm up, but there are definite fears about a double dip recession, and the impact that would have on the market overall. If we do enter a downtrend here and the economic forces come to bear, we will see discounting rev up again, probably sometime in 2012.

- In direct to consumer, we are removing some of the bait, offering less discounting, less free shipping. We are still providing some level of incentive to get people to act, but we are actively and deliberately pulling back there. I would say the same about wholesale, but maybe a little less so. Basically, everything we had budgeted for wholesale, we were going to spend in 2011, because to go out and get by-the-glass business and feature business is expensive in the marketplace and, in the wholesale place, there are more brands out there, so we will continue to churn the waters. You have to fight harder to get the attention of your consumer.

HAS DISCOUNTING ENDED?
SUMMARY

- Opinions about whether or not discounting is here to stay are mixed. Some think there has been a reset and consumers will not stomach a return to the wine market of several years ago. Others think that shortages will allow us to throw off the yoke of discounting.
- What is clear is that, at this moment, discounting is continuing, but has eased.
- Stronger and lower-priced brands have been able to resist discounting or rebound from it more easily.

Q: *Do you work with third-party wine clubs? (Part I)*

YES, AND WE LOVE THEM

- We do sell to third-party clubs. I am happy with that. It brings people into the category; it brings a variety

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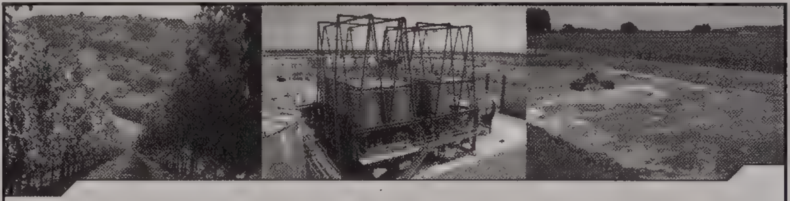
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of wines in an assorted case; and it exposes the consumer to all kinds of different wines around the world. It is a good thing.

NO, AND WE ARE NOT INTERESTED

- Many of these third parties just want your contact information, your consumer base, and we are not ready to give that out just yet.
- We started out selling to clubs about 2½ years ago, but I am no longer doing that. The decision to stop was due in part to distributor pressure, and in part because we do not need that channel because we are using all of our wine for branded product.

ONLINE SITES

- The one entity that everyone is very nervous about is called Wine 'Til Sold Out, because they have such a high profile. Everybody watches them. I do not think there is an industry person who does not subscribe to Wine 'Til Sold Out's mailing list, and they want to see who has excess juice today. They are the biggest of the five entities, and certainly the most discussed. They have been amazing.
- About two years ago we tried Rue La La. At the time, they had 1.6 million viewers. They have over 2.5 million viewers now. I wanted to reach out and get some new customers, but I also wanted to see if we could move a little volume. Because of the overall philosophy of reducing our discounting and because of the potential — we were one of the early adopters — I am less excited about it now. We did not do any in 2011.
- We have not done third-party clubs, but we have done some business with the guys like Rue La La, Wine Access, and companies of that nature. They have a lot of reach in the market — a broader audience.

The short-term objective there is to move some inventory. On a long-term basis, we are hoping to expose the right customers to our brand, and capture them for direct sales. That would be the holy grail of those types of activities. The economics are not as great as straight to consumer, but may be a little bit better than wholesale. So there is profit in it, but on a long-term basis, we hope the consumer sticks around. It has been good. We are getting ready to do something with Rue La La again before too long.

Q: *Do you produce for private labels? (Part II)*

FOR DEALING WITH OVERAGES

- We have done some private labels with our overages. That can be a good situation. For some national retailers that we do business with, we made some wine available for a private label. We hope that in the long term, it helps our core business — that we develop a deeper relationship, and become a vendor they develop confidence in with our business practices and our turnaround.

Ideally, we are able to advance our core brand. That linkage is not upfront. It is not quid pro quo: "I'll do this for you, if you do that for me." I guess the intended outcome on our part is building a good relationship. Once you get to know somebody by having a successful transaction with them, there is a level of comfort and ideally that becomes a wedge for more business going forward.

YES, AND WE LOVE THEM

- Private label business, for us, is absolutely on fire. At some of my wineries, 90% of our business comes out of our tasting rooms and wine clubs, but in addition to that, we are doing private labels out the back door. That business more than doubled in 2011. There seems to be a pretty large appetite for a couple of the players. Not all of the market is in this area. The Safeways and Costcos of the world are more organized around branded business. But the Trader Joes, the Total Wines, and the Fresh and Easys — those guys are a little more organized, or in some cases, a lot more organized, around private labels.
- We do some private labels. It has been a good experience. We do not go as deep as everybody else, but just pick and choose. It is a healthy exercise to develop relationships with the chains.
- We make private labels. It is excellent business.

BAD BREAKUP

- We do no production for private labels. We have had bad experiences with them in the past, and I can only recall one that worked for us. It seems like there is always some problem. Whenever the director changes in the hotel chain, you end up with this excess inventory with a certain hotel's name on it.

NO ON BOTH COUNTS

(PRIVATE LABELS AND THIRD-PARTY WINE CLUBS)

- We have tried that a couple of times and we are happy to do it, but long-term it usually ends up that we get into a short position (with both clubs and private labels). There is no economic benefit to do it out of Sonoma or Napa.

THIRD-PARTY WINE CLUBS

SUMMARY

- The market is seeing a great deal of private label activity. Many wineries are resistant to it, or have had bad experiences, though some find it to be highly profitable.
- Participation in traditional third-party clubs is less significant, but attitudes toward them and results are similarly mixed.
- Many high-profile labels seem to be dabbling with third-party Internet sites, but no one seems certain yet whether this is a good thing or not.

Q: *How is your relationship with lenders?*

- We usually get what we ask for, but the reason that the relationship is strong is that we have really good forecasting skills here. For example, in 2011 we saw one slight hiccup, but we told them one year in advance, and they were prepared for it, and there were no issues.
- For the last two years, they have been begging us to put on more financing. This past year, we renewed and expanded our line of credit. We have had no problems whatsoever, but the paperwork is longer. Terms are better than they would have been one or two years ago.
- Our bank loans us as much money as we want. We do not have much debt. My sense is that the good wineries can borrow what they need to, and bad wineries are having a hard time getting money.
- For me, the relationship with lenders I will call reasonable. The dynamic

has changed. It is easy enough to get the bank to support a vineyard purchase, but appraisals are lower than anticipated, and the bank will only lend 75% on the appraisal. They are sticking with that, being pretty tough, with demands for ensuring where the fruit is going to go. The whole system is much, much tighter, but at the same time we are able to negotiate better terms on interest rates, which have slowly gone down. The market is pretty soft. Banks need borrowers; they are just more picky about them. If business is good, they are good to you. If business is not good, they are tighter.

- Lenders are being much more mindful of covenants, and more analytical about our business. They want to meet with us, and are asking better, more meaningful questions than they ever did, which will allow them to go to their credit committees with more satisfaction that everything is fine. We are all being looked at as a potential risk over time, because they got shocked in the last go-around over housing, which may have made them better bankers. As a result, the credit is there, but you have to earn it.

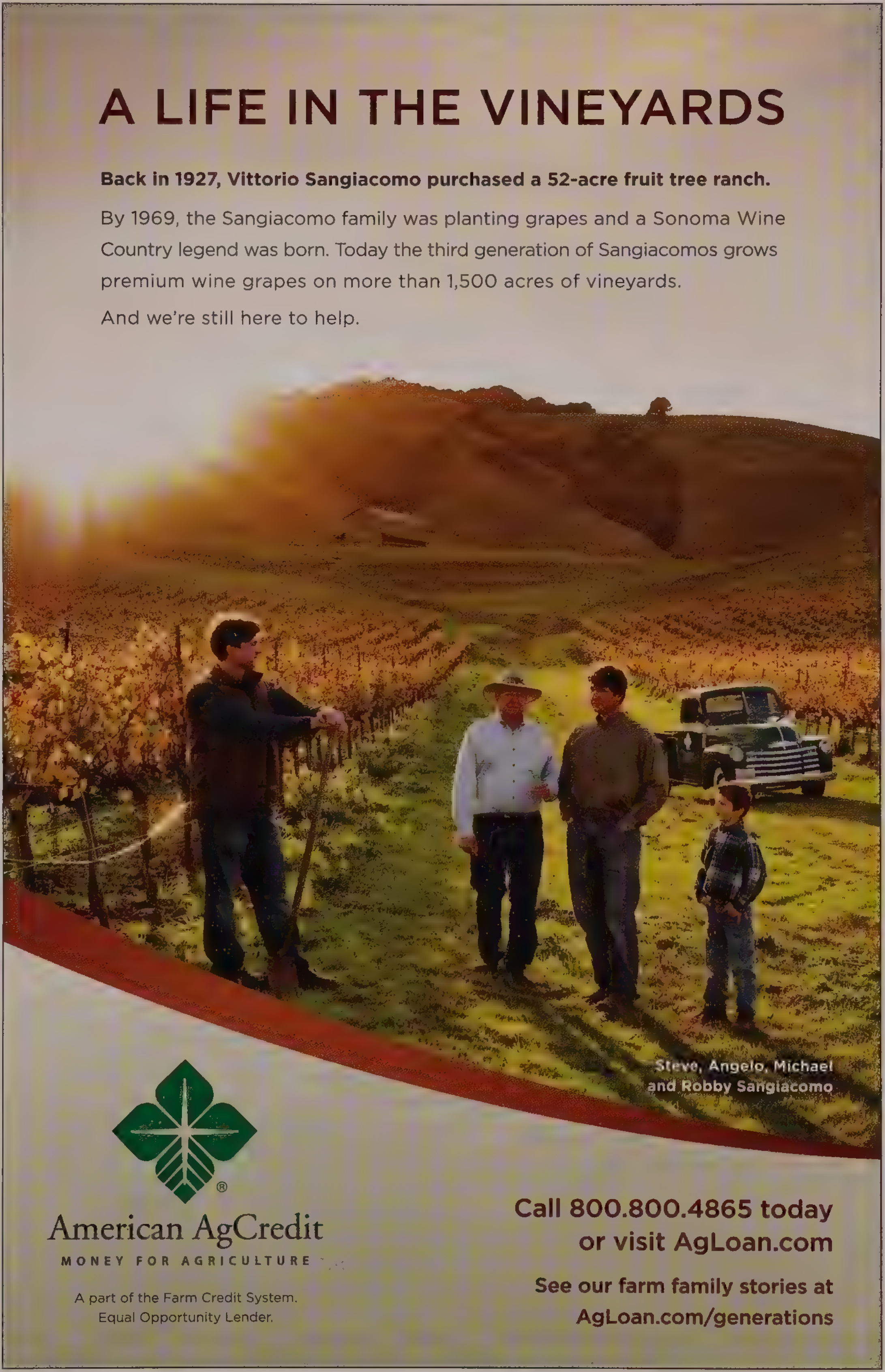
RELATIONSHIP WITH LENDERS
SUMMARY

- For the highly-successful companies surveyed, credit is still very available.
- Banks have the capital and want to lend it at advantageous rates to financially solid wineries.
- Even with these preferred clients, banks seem to be performing more thorough due diligence and are sometimes instituting more restrictions and requirements.

Q: *What will be the hottest issues over the next five to ten years?*

DISTRIBUTION AND CONSOLIDATION

- More consolidation in the distribution community is going to be a big challenge in the next five years. Consolidation will change how a mid-size winery like ours has to sell its wine. We are going to have to break through the levels of management of these big distributors.
- There is not a whole lot more room for further distributor consolidation, unless Southern Wine & Spirits develops a nearly national platform. The talk has been — if Southern is the red team, will Young's, RNDC, Wirtz, and Charmer-Sunbelt get together and form some sort of a blue team? That is about the only further possibility I see. The only place the big, powerful, multi-state distributors are in would be the franchise states where they cannot really get in.
- What is Warren Buffett going to do? Where does that lead?
- Many people wonder where Warren Buffett's interests are going and frankly, that has been rather quiet. I have not heard a lot about his purchases in Georgia, North Carolina,



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Tennessee. The fact that he lined up states where he has distribution centers will be a hot topic. McClain, his business unit, has applied for licenses in several major states, including California, Texas, and Illinois. That is a big question mark for the future. What is their model going to be? All the major domestic markets, except for Florida, have two major distributors.

In Florida, you still have three players, but there have been rumors for more than one year that there will be a merger between RNDC and Charmer-Sunbelt. Is McClain going to be a third option? It could be a good thing for smaller wineries, to give them a voice. That would really open up some doors. Something like 50% of cigarettes in the U.S. are distributed by them. They have a huge footprint, so they are the wild card.

- On-premise restaurateurs responded to the recession by getting more aggressive, creative, and promotion-oriented. One has gone back to established brands. They do not want wines on their list that no one has ever heard of. They need wines they can sell, so that their consumer walks in and says, "I know this wine, I like this wine, I'll buy this wine." A lot of the wine captains and sommeliers were restricted by budget, or their positions were eliminated, and this brought a return to franchise brands.

Another positive trend in the recession has been an emphasis on promotions, like "50% off wine nights," that bring in a crowd. Although head counts have come back earlier than dollar counts, now we are starting to see spending grow. There still seems to be a stigma around that $100 price point, but we are past crawling now, and seeing stronger purchases.

- The reality of consolidation is a hot issue. There used to be many grocery chains: Ralph's, Albertson's, Kroger, Safeway, Alpha-Beta, Lucky Stores. Now there are three buyers that cover the universe of grocery chains in the U.S. So, they have taken the wine-buying departments of different chains and put them in three headquarters.

The same is happening with chain restaurants, which are dominating the market and the growth in national accounts, both off-premise and on, and consolidation of buying channels is getting tougher and tougher. With the consolidation of the distribution channel and consolidation of producers, you can almost see the five largest wineries doing business with the five largest retailers and the five largest on-premise chains, and everybody else getting a piece of the rest.

- It will be interesting to see how the distributor network continues to evolve. It may move more toward a delivery mechanism, looking at the U.K. as a model. Not that we would go that far, but perhaps it may move in that direction. Distributors may provide an efficient delivery mechanism for small accounts like restaurants, while large accounts like chain stores would have direct delivery. This could be evolving, and it would be more incumbent upon the wineries to build and sell their brand.

- The biggest thing for us is continuing share of mind at the distributor level. Keeping the brand fresh. Freshness is important in package design and new offerings. You have to constantly bring something new to the distributor today.

REGULATION

- Regulation has been modest and manageable in an industry that is

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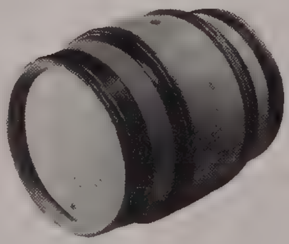

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governed by 50 different sets of laws. It will become increasingly more difficult and more punitive at all tiers: on the local level for land use issues; on the state level for taxing and distribution; and on the federal level for label approval, excise taxes, and other nationwide policies.

- We are going to see control states open — maybe not all of them, but some of them.
- If this House of Representatives direct-shipping bill continues to get footballed around Congress, and there continue to be appeals to the Supreme Court on outlawing direct shipping, that will be huge. There are a lot of us that are smaller than midsize who live off the profits of direct-to-consumer sales, and though we have a franchise nationally, if that went away we would have some real issues with direct.

ENVIRONMENTAL CONCERNS

- We are going to talk much more about water. Use of impaired water is going to be much more important — on the North Coast for crop protection, on the Central Coast, and just in general. Even though we have had a few good years of snow melt, the farmers are still not getting the water they feel they deserve. Water is going to be a huge issue.
- Global warming and local climate change. We have to be more responsive during the growing cycle, and we have to figure out how to handle this on a long-term basis. We are getting more extremes.
- Climate change is huge. We do not know how significant it is going to be, but look at what happened in Australia (2011 harvest). The endless rains had a negative effect on the harvest, causing some product loss and other product quality to drop.

SATISFYING AMERICA'S INSATIABLE THIRST

- The consumer's appetite for "discovery wines" appears to be endless. I am not sure if you would believe anyone who said to you that chocolate wine was going to be one of the hottest things in the market. I mean, chocolate wine? A brand called Cupcake offers dessert and indulgence in a glass. It is more than variety — it is experimentation and discovery. Who knows what will come in terms of "discovery wines," which now seem to be moving closer to food preferences and tastes than wine preferences. It is a level of experimentation and discovery that we have not seen.
- The important thing is that the American wine business is going to grow and grow. We are only 235 years old, we are still learning, and we are going to be drinking wine forever.
- You have generations of people who historically have not been wine consumers — the mid-20s demographic — and we are seeing that backfill going from the coasts into the Midwest, growing dramatically.

Product availability is growing. Historically, it was grocery stores, some liquor stores, and restaurants, but now we are seeing wine placed in much broader distribution, including in upscale neighborhood convenience stores, moving into wholesale clubs, mass merchandising channels, and stores like Walmart and Target that have historically never had wine products and are now moving aggressively into wine. Availability of the product will drive adult wine consumption.

- What is going to happen with this keg wine business? Does it have real wheels? I am not watching anyone in particular right now, but I have been talking with some of our wholesalers

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and restaurateurs to find out who has actually been interested in it.

- Supply for sure. It is going to be short across the board in California. There is not enough bearing acreage. We have not done any planting, and we know that cycle is a fairly long cycle. We are not reacting here; we are gun-shy.
- The Millennial group is really embracing wine. That is a tremendous asset for the wine industry, at all price points across the board.
- We will continue to be concerned about the shipping direct-to-consumer business. Not just whether the laws stay the same, but also with shipping rates. The one thing we all seem to assume is that the consumer will continue to pay inflated pricing for delivery on a direct basis. That is an Achilles heel. We are all concerned about shipping wine in the heat, so we ship overnight or two-day, and this can be $60-or $70 for a package. Will shipping rates be going up dramatically because of the cost of fuel? At some point the consumer would say, "That is too much to pay for shipping."
- China. We will have to see how it influences us as an export market for the U.S. That is a huge, untapped market, and a relatively unknown market as well.

HOTTEST ISSUES SUMMARY

- Retailer and distributor consolidation is going to make things tougher on wineries below an ever-rising size threshold. But there is some speculation that Warren Buffet may provide a new option.
- Everyone is still watching the shipping laws, but some are worried that the government's fiscal problems could bring in new regulations.
- Environmental regulations, water shortages, extreme weather patterns, and climate change may become an increasingly important limiting factor on supply.
- The U.S. consumer base will continue to drink more and more wine, and explore new options. Meanwhile, more consumers look to be coming online abroad.

- The consumption base in the U.S. and Asia will continue to grow. There will be increased demand for premium wines in the U.S. and around the world and as a result, there will be shortages with cool climate, better quality grapes. Demand will go up and supply will not be able to meet it, at least in the mid-term. ■

Presented by the UC Davis Graduate School of Management, Department of Viticulture and Enology, and the Wine Executive Program. Led by world-class faculty, the UC Davis Wine Executive Program focuses on the management skills critical to success in the industry. Next sessions: March 26-29, 2012, UC Davis Campus, Gallagher Hall, Graduate School of Management, Robert Mondavi Institute for Wine and Food Science. To register and for complete information on sponsorship, curriculum, and faculty, call 530/754-6450 or visit www.wineexecutiveprogram.com

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IN MEMORIAM

Emeritus Professor Ralph Kunkee passes away

BY David E. Block,
Ernest Gallo Endowed Chair in Viticulture & Enology
Professor and Chair, Department of Viticulture & Enology

Ralph Kunkee, Professor Emeritus of Enology at the University of California at Davis, passed away on November 12, 2011 from complications due to cancer. The Department of Viticulture & Enology faculty and staff will all miss him — his love of life and learning were infectious.

Ralph joined the department in the early 1960s and taught in the department until his retirement in 1991. Ralph's major research and teaching interests dealt with wine yeast, malolactic fermentation, and the sources and controls of microbiological spoilages of wines.

The wine yeast studies that he completed involved the characterizations, descriptions, and utilities of various yeast strains. The data from these studies are now standard winemaking tools in the global wine industry. Prof. Kunkee's work on malolactic fermentation helped bring understanding to this bacterial activity, and how to control it. These research efforts resulted in the publication of nearly 150 scientific articles, and Ralph was also co-author of two enological texts. Several of the research articles, and one of the texts, received prize-winning acclaim.

In addition, Ralph played a helpful role in the transition of the American taste in wines -- and the corresponding change in California wine production -- from high alcohol dessert/appetizer wines of the time to the lower alcohol table wines of today, by indoctrinating and urging the use of sterile filtration and sterile bottling as the standard means for wine stabilization. He visited essentially all major wine growing regions of the world, and spent 12-month sabbatical leaves in Germany and France.

Ralph calculated that he taught more than 1,000 students in his specialty laboratory course: Microbiology of Winemaking — and most of those students are now widely distributed throughout the wineries of California and of the rest of the world. Even after he retired, Ralph was still involved in lecture presentations, in consultations and in wine judgings. Ralph instructed a Distance Learning class "Introduction to Winemaking" class through UCD Extension, with about 100 students annually.

Aside from his professional accomplishments, Ralph was a wonderful, warm person. His hospitality was legendary, and it was impossible to not have a good time in his presence, especially when he would flash his trademark smile under a bushy mustache, inevitably with a glass of wine in one hand.

The Department of Viticulture & Enology held a memorial service in early January, followed by a reception and celebration of Ralph's life. To make a donation in Ralph's memory, obtain details at: practicalwinery.com/links/?memoriam ■

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Vitis californica and hybrids as hosts for Grapevine leafroll virus

Typical leafroll symptoms on Cabernet Sauvignon

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Determining if native *Vitis* are alternate *Grapevine leafroll-associated virus* (GLRaV) hosts that might serve as reservoirs important in the continued spread of grapevine leafroll disease was the objective of this research.

Vitis samples surrounding nine Napa Valley vineyards were collected and tested for GLRaV-1, -2, -3, -4, -5, and -9, *Grapevine virus A* (GVA), *Grapevine virus B* (GVB), and *Grapevine virus D* (GVD) using both conventional RT-PCR and realtime RT-PCR. Twenty four *Vitis* samples from three riparian areas not near vineyards were also included.

DNA fingerprinting indicated that the *Vitis* samples consisted primarily of *V. californica* followed by *V. californica x V. vinifera* hybrids. In the riparian areas not located near vineyards and areas adjacent to three of the nine vineyards, single and mixed infections of GLRaV-2, -3, GVA, and/or GVB were detected in106 of the 230 *V. californica* and 11 of the 19 *V. californica x V. vinifera* hybrids

Phylogenetic analysis of GLRaV-2 and -3 indicated the isolates from *V. californica* and *V. californica x V. vinifera* hybrids were closely related to *V. vinifera* isolates.

Grapevine leafroll disease is one of the most economically damaging and widespread diseases of *Vitis vinifera* throughout the world. To date, eleven different phloem-limited viruses, identified as *Grapevine leafroll-associated viruses* (GLRaVs) 1, 2, 3, 4, 5, 6, 7, 9, 10, 11, and *Carnelian* have been isolated from diseased grapevines and characterized. All GLRaVs can be graft-transmitted; GLRaV-1, -3, -5, and -9 are also transmitted by several species of mealybugs (Homoptera: Pseudococcidae) and soft scale insects (Hemiptera: Coccidae).

While the incidence of leafroll disease due to graft transmission has been reduced in propagative material through the use of certified clean planting stock, disease incidence associated with insect transmission still occurs in many grape growing regions.

Disease distribution patterns indicate two common patterns of spread: 1) two or more infected vines directly adjacent to each other in the same row, and 2) a focus of infected vines at the edges of a vineyard with a gradient of diminishing incidence towards the middle or other side of the vineyard.

This latter pattern suggests that leafroll disease has been introduced into a vineyard from an established external source on one side of the vineyard. In most cases the number of infected vines in these gradients increases in the opposite direction of an adjacent older, infected vineyard. These vineyards probably serve as the source of the disease where mealybugs acquire the virus and then are spread to neighboring vineyards by some combination of wind, laborers, or machinery.

The introduction of leafroll disease from outside sources is particularly worrisome because it is difficult to control and has the potential to compromise the benefits of clean plant programs. Older infected vineyards are one obvious disease source; it is also possible that there are other yet unidentified outside sources.

In an effort to identify possible alternate hosts for the grapevine leafroll-associated viruses and vitiviruses, numerous *Vitis* and non-*Vitis* species were surveyed within and surrounding nine vineyards in Napa County, CA, with vines showing typical leafroll disease symptoms. Three riparian areas in Napa and Yolo counties that were not near vineyards but that included a number of endemic *Vitis spp.* with red leaves were also identified.

Materials and methods

VINEYARDS AND SAMPLE COLLECTION: Nine Napa County vineyards were selected that had *V. vinifera* with red leaf symptoms typical of leafroll disease and were adjacent to areas with wild *Vitis* and non-*Vitis* species. Three riparian areas were also chosen that were not adjacent to vineyards, but had a number of non-cultivated *Vitis* with red leaves.

Outside the vineyard, *Vitis spp.* and

Long-tailed mealybug adult and nymph.

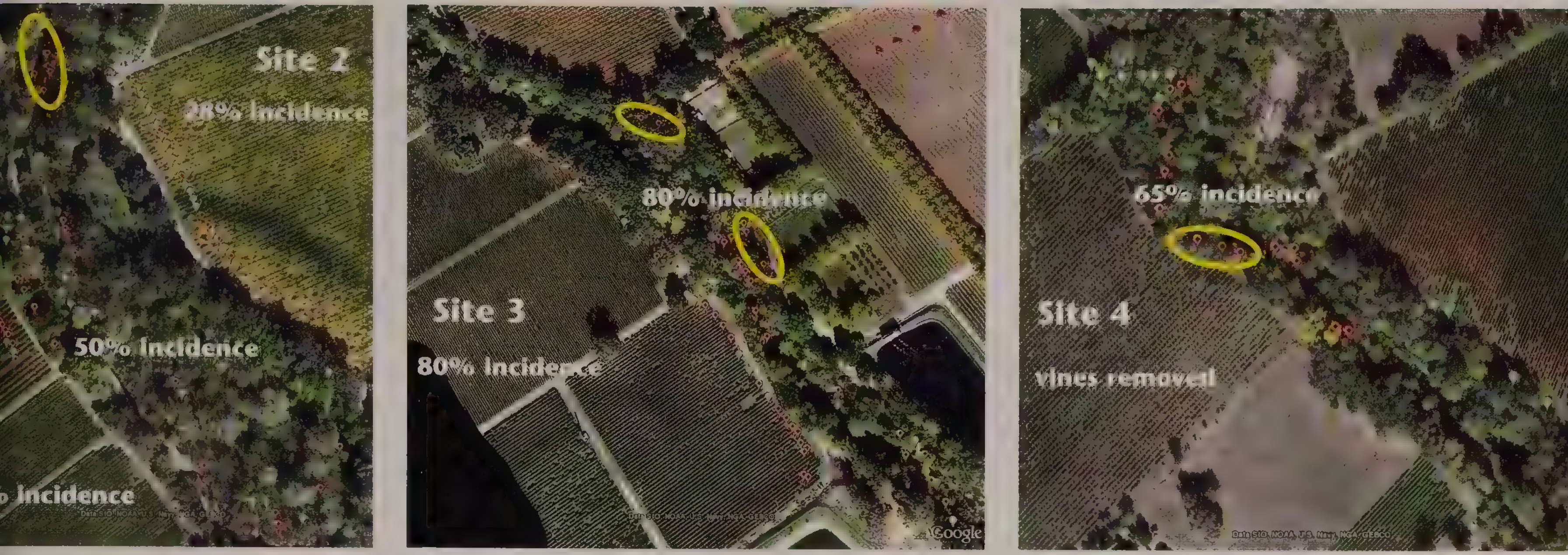

Figure 3. Aerial images showing sites 2, 3, and 4, where GLRaV-3 incidence in wild and cultivated grapes was high.

● = virus positive vine

● = virus negative vine

the most common woody non-*Vitis spp.* that were present within a 25 m2 area adjacent to symptomatic *V. vinifera* blocks were collected. Within each vineyard, at least three vines from a block adjacent to non-cultivated *Vitis* and/or non-*Vitis* were collected.

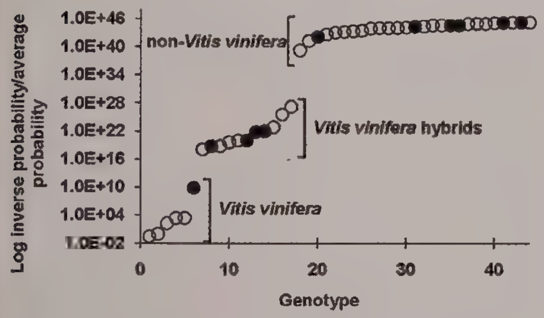

Figure 1. Grouping of *Vitis* genotypes. Each circle represents a unique genotype; solid circles are genotypes that are positive for GLRaV-2 and -3, GVA and/or GVB. The value shown is the inverse log10 of the probability of the genotypes being *V. vinifera* divided by the average probability associated with five diverse *V. vinifera*.

Herbaceous plants were collected by establishing three 1 m2 plots located within 10 meters of the symptomatic *V. vinifera* collected the previous Fall. Within each plot, three replicate samples of all the dicotyledonous species were collected and pooled. Like species were also pooled between plots due to the large number of different species.

VIRUS DETECTION: Vitis and woody samples collected in Fall 2008 were assayed for GLRaV-1, -2, -3, -4, -5, -9, GVA, GVB, and GVD, by both conventional and real-time RT-PCR. Only real-time RT-PCR was used to detect these same viruses in herbaceous samples collected in Spring 2009, and Vitis and non-Vitis samples collected in Fall 2009 and 2010. Real-time RT-PCR assays were run in duplicate or triplicate, and data was analyzed quantitatively by measuring the cycle threshold (CT).

VIRAL DNA SEQUENCES: Total RNA from the samples positive by real-time RT-PCR was re-amplified, also using RT-PCR. Nucleic acid sequences were compared using BLAST from the National Center for Biotechnology Information, and aligned and edited.

VITIS GENOTYPE: The non-cultivated *Vitis* samples from outside the vineyards were analyzed at 18 Simple Sequence Repeat (SSR) DNA markers. The resulting DNA profiles were compared to over 1,200 unique grape DNA profiles. To identify the species background of the samples, a genetic approach was used to calculate the probability of observing each unique profile from this study and those of five diverse *V. vinifera* cultivars, based on gene frequencies from a

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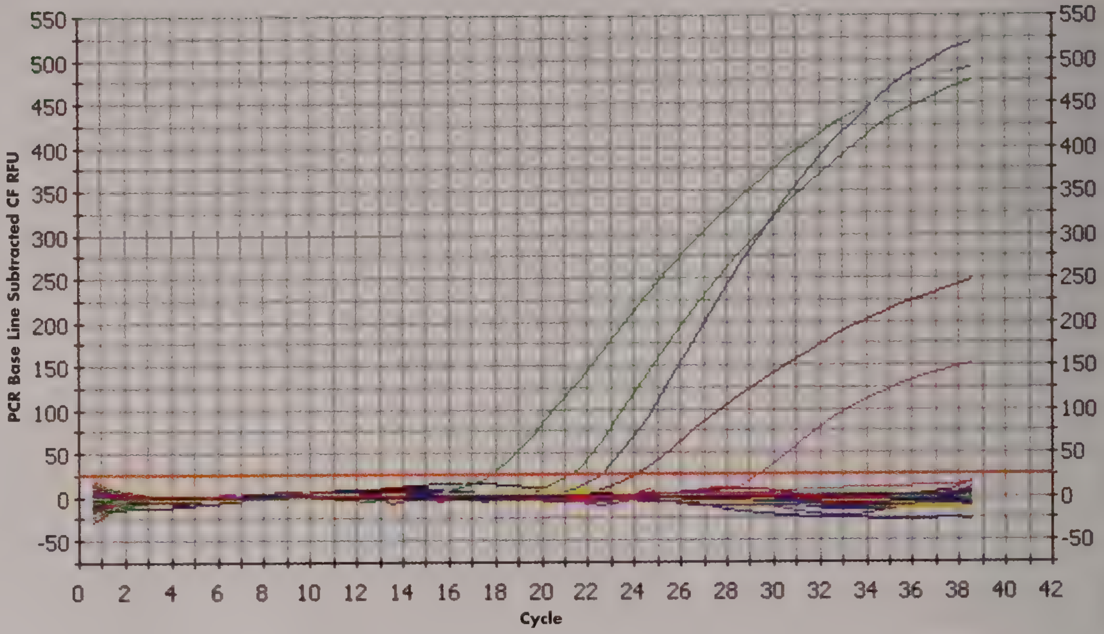
population of 200 random *V. vinifera* cultivars. The results were expressed as the inverse of these probabilities divided by the average of the probabilities of the five *V. vinifera* profiles.

Results I: Plant survey

More than 600 plant samples (2008, 2009, 2010) were collected from in and around nine vineyards (Sites 1 to 9) and two riparian areas (Sites 10 and 11) in Napa County. Samples included wild *Vitis*, non-*Vitis* representing 83 species, and cultivated *V. vinifera* from within vineyards.

Results II: Wild Vitis genotypes

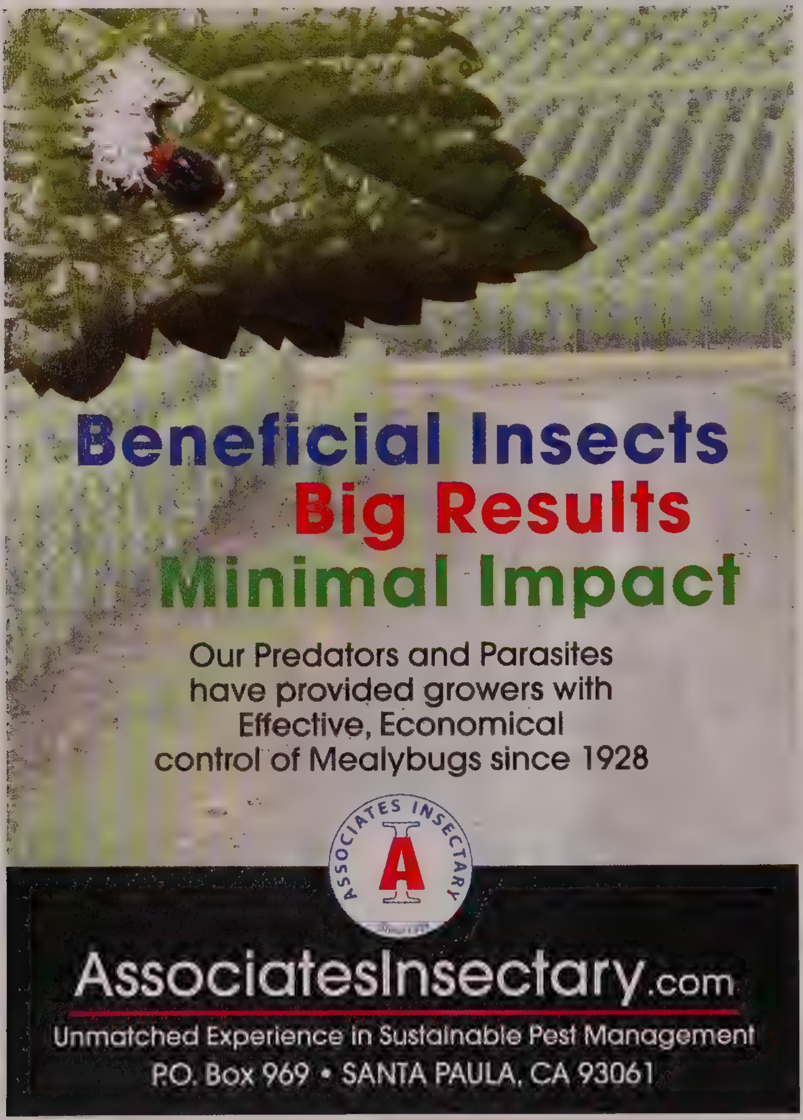
Leaf morphology indicated that the majority of the wild *Vitis spp.* were *V. californica* or *V. californica x V. vinifera* hybrids. This was also confirmed by genetic analyses. Leaves of *V. californica x V. vinifera* hybrids were generally heart-shaped like *V. californica*, with some lobing like *V. vinifera*.



Graph: Real-time RT-PCR output. Positive results are above the threshold (orange line).

DNA fingerprinting indicated 48 unique multilocus genotypes. Four of these were known scion or rootstock cultivars and were excluded from further analyses.

Within the remaining 44 genotypes, a self-seedling of Cabernet Franc and first generation hybrids of *V. vinifera* were identified We were also able to identify the parent cultivar of six



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A *V. californica* that tested positive for GLRaV-3.

hybrids. Species designations were assigned to the 38 remaining unique genotypes by calculating the probability of a sample being *V. vinifera* rather than *V. californica* because there is no database of *V. californica* profiles. In this manner, a decreasing *V. vinifera* contribution was illustrated (Figure 1).

Results III: RT-PCR assays

The *Vitis* and non-*Vitis* samples collected in Fall 2008 were assayed using both conventional RT-PCR and real-time RT-PCR.

A hybrid of *V. californica* x *V. vinifera* 'Merlot' that tested positive for GLRaV-3.

175 *Vitis* samples had positive CT values between 17.1 and 35.6, which for all samples indicated a nucleic acid amount within a 105-fold difference, relative to positive controls.

Results IV: Virus incidence

In six out of nine sites adjacent to vineyards (Sites 1, 5, 6, 7, 8, 9), all wild *Vitis* tested negative for the viruses included in this study. At three sites, (Sites 2, 3, 4), which were within 2 km of each other along the Napa River, 100% of the wild *Vitis* collected in 2008 tested positive for GVA and/or GLRaV-3 (samples circled in yellow in Figure 3). We returned to these three sites in 2010 and collected 164 additional samples; the incidence of GLRaV-3 was 50% to 80% in wild *Vitis* and 28% to 80% in *V. vinifera* within vineyards (Figure 3).

In the two sites not adjacent to vineyards (Sites 10 and 11), 4 out of 21 (19%) of the wild *Vitis* tested positive for virus. Three samples tested positive for all four viruses — GLRaV-2, -3, GVA, and GVB — and one tested positive for GVA only (data not shown).

All *Vitis* samples tested negative for GLRaV-1, -4, -5, -9, and GVD. All non-*Vitis* tested negative for all viruses investigated.

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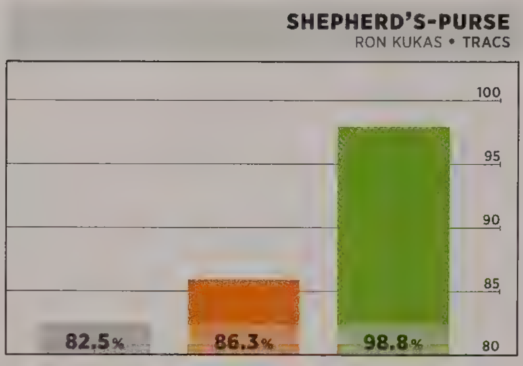

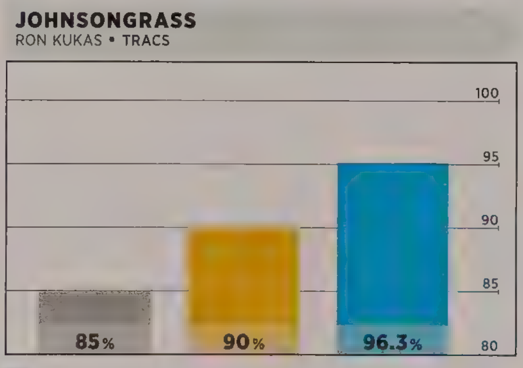

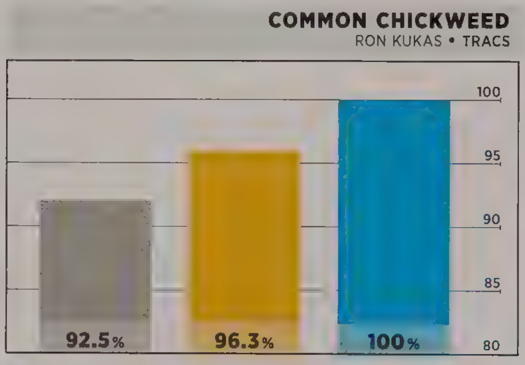

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Leafroll symptoms in wild vines were observed sometimes, but often not.

Results V: Viral sequences

Partial CP gene sequence data was collected for five GLRaV-2, 17 GLRaV-3, nine GVA, and five GVB isolates from non-cultivated Vitis and adjacent V. vinifera. The GLRaV-2 RT-PCR products were 88% to 94% identical at the nucleotide level to GLRaV-2 gene sequences in GenBank; GLRaV-3 products were 88% to 100% identical to GLRaV-3 gene sequences; GVA products were 91% to 93% identical to GVA gene sequences; and GVB products were 95% to 97% identical to GVB gene sequences.

Conclusions

A high incidence of GLRaV-3 and/or GVA in *V. californica* and *V. californica* × *V. vinifera* hybrids was identified in one localized area of the Napa Valley, establishing that these wild Vitis are GLRaV-3 and GVA hosts.

Wild grapes at six other sites were not positive for the viruses included in this study, despite the fact that most sites had many wild vines within several meters of virus-infected vineyards. This suggests that GLRaV-3 and GVA incidence is not widespread in *V. californica* and hybrids in Napa Valley.

Analyses of GLRaV-3 gene sequences indicated that the GLRaV-3 isolates from wild and cultivated grapes were closely related. This suggests that these wild isolates probably do not represent a major source of diversity that could lead to major epidemics in *V. vinifera*.

GLRaV-2 and GVB were detected in wild grape samples collected in riparian areas not adjacent to vineyards. Analysis of the GLRaV-2 gene sequences suggested that GLRaV-2 was probably introduced into riparian areas relatively recently, via *V. vinifera* infected with GLRaV-2.

GLRaV-2 is the only leafroll-associated virus included in the genus Closterovirus, whose other members are transmitted semi-persistently by aphids. No GLRaV-2 vectors have been identified, however, and spread within vineyards has not been observed.

Aphids are not common on grapes in California, but have been periodically reported. It is possible that they could be much more abundant in riparian areas and serve as a GLRaV-2 vector. ■

Heartfelt thanks to the American Vineyard Foundation and the North Coast Viticulture Research Group for funding this project; numerous growers in Napa County; K. Lowe and [illegible] Saldivar for assistance in locating study sites; J. Roncoroni, J. DiTomaso, and E. Dean for plant identification assistance; J. Yang, FPS, for assistance in DNA identification; and numerous FPS staff for assistance in sample collection and testing.

For more information:

Klaassen, V.A., S.T. Sim, G.S. Dangl, F. Osman, M. Al Rwahnih, A. Rowhani, and D. Golino. 2011. *Vitis californica* and *Vitis californica* × *Vitis vinifera* hybrids are hosts for Grapevine leafroll-associated virus-2 and -3 and Grapevine virus A and B. *Plant Dis.* 95:657-665. online at www.apsjournals.apsnet.org/doi/pdfplus/10.1094/PDIS-09-10-0621

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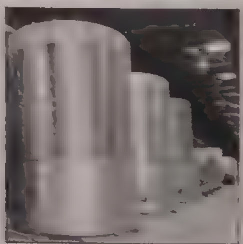

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RUSSIAN RIVER WATERSHED

Growers file lawsuit opposing regulation of frost-protection water

BY **Aubrey A. Mauritson, Esq.**

Esterlina Vineyards, Anderson Valley, CA (Photo: Steve Sterling)

Local growers and citizens in the Russian River watershed in Northern California have filed a lawsuit against California's State Water Resources Control Board (SWRCB) for an unprecedented regulation targeting North Coast grape growers' use of water for frost protection. The lawsuit was filed in the Sacramento Superior Court on October 20, 2011.

The regulation was brought about by a letter sent to SWRCB from the National Oceanic Atmospheric Administration (NOAA) Fisheries Services on February 27, 2009 "expressing concern over the threat to federally threatened and endangered salmonids of frost protection irrigation by vineyard owners in the Russian River watershed." In 2008, two strandings of fish occurred — one in Sonoma County and one in Mendocino County. Based on this limited data, NOAA decided a substantial threat was occurring.

According to its responsive comments, SWRCB stated: "scientific research indicates that the two episodes of stream dewatering documented by NOAA Fisheries were not isolated incidents, and diversions for purposes of frost protection likely are adversely affecting salmonids throughout the Russian River watershed."

SWRCB then cites a study, funded partly by the Environmental Protection Agency's research grant program. One author of the study commented on the regulation: "Continuous data collection and monitoring are necessary to establish *whether changes in streamflow occur because of frost protection use.*" (Emphasis added). This is the only evidence SWRCB has cited as support for the new regulation.

The regulation declares that all frost protection diversions in Mendocino and Sonoma Counties downstream of Lake Mendocino and Lake Sonoma between March 15 and May 15 of the year are "unreasonable" unless the diverter is complying with a Water Demand Management Program (WDMP).

While growers continue to make improvements to fishery resources, litigation is still essential as SWRCB has passed a regulation restricting the use of one of the grape growers' most important farming practices. The University of California, Davis cites that economic losses due to frost damage exceed all other weather-related phenomena in agricultural production.

Alternatives covered

SWRCB has stated alternative options for growers. However, the agency fails to address that alternatives such as orchard heaters and wind machines may not achieve the same results as applying water to protect against frost. According to a California State University, Fresno study, water is a viable option to protect vines when temperatures drop to 25°F. The same study cites that use of heaters in combination with wind machines allows for protection down to approximately 26°F, but this requires there to be a temperature inversion layer.

There was no such inversion during the 2008 fish-stranding events. Orchard heaters also present significant environmental and practical issues such as air pollution, danger of hazardous materials cleanup, and costs of fuel and labor. Using water for frost protection still is the most sustainable agricultural practice.

Regulation applicable to EVERY water diverter

Every grower who uses water for frost protection in the geographic region of the Russian River watershed, a region approximately 100 miles long and from 12 to 32 miles wide, is subject to the regulation. Each and every water diverter regardless of the type of water right held or method of diversion (riparian,

Cowhorn Vineyard, Applegate Valley, OR

Tablas Creek Vineyard, Paso Robles, CA

pre-1914 appropriative, permitted or licensed appropriative, and "hydraulically connected groundwater") is treated the same until the grower can prove their water use is not affecting the Russian River watershed, including areas where no impact to salmonid habitat have been documented.

Compliance set for February 1, 2012

SWRCB only stated growers must comply with a WDMP. While the regulation establishes WDMP goals such as developing an inventory of frost water use, a risk assessment plan, and a corrective action plan, the regulation fails to mention how these goals will be achieved and what enforcement measures could be taken against growers. Yet compliance is set to begin February 1, 2012. Failure to comply with the unknown could mean restricted water use during the spring months and a potential devastating or total crop loss.

Grower arguments and hope

Growers argue that several water law doctrines have been inappropriately applied or ignored in the regulation, such as improper applications of the "reasonable use" doctrine, priority of rights, and failure to adjudicate on a case-by-case basis. Growers also argue the regulation is not "reasonably necessary," as required by California's Administrative Procedures Act, and SWRCB failed to comply with the California Environmental Quality Act.

Growers are not pursuing litigation arguing that endangered species should not be protected. Growers have been proactive in attempting to address any problems that may exist, and continue to improve water courses for the benefit of endangered species. Efforts have proven successful, as a recent *Santa Rosa Press Democrat* article stated that Chinook Salmon (adult salmonids) are in the Russian River in "near-record numbers."

Growers hope SWRCB will rescind the regulation and re-engage with cooperative and effective regional efforts to manage water resources in Mendocino and Sonoma counties. Doing so will benefit growers, the environment, and the wine and agricultural economy in California.

While at present the regulation targets only the Russian River watershed, if it is found to be constitutionally sound there is no legal reason it cannot be applied in other regions of California. Therefore, this is certainly a regulation of statewide importance. ■

Aubrey Mauritson is an associate attorney at Perry, Johnson, Anderson, Miller & Moskowitz, LLP in Santa Rosa, CA. She and her husband farm winegrapes in Sonoma County (Dry Creek, Rockpile, and Alexander Valley appellations), with six generations of family history, and have a winery. Aubrey is a fourth-generation citrus farmer (Central Valley of California). She can be reached at Mauritson@perrylaw.net.

Websites of interest:

SWRCB's website for the Russian River watershed: *http://www.swrcb.ca.gov/waterrights/water_issues/programs/hearings/russian_river_frost/*

Study cited by SWRCB in support of the regulation:

http://ucanr.org/sites/merenlender/files/20095.pdf

Sonoma County's Frost Protection ordinance:

http://www.sonoma-county.org/agcomm/frost_protection.htm

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VIEW FROM THE VINEYARD

A Practical Guide to Sustainable Winegrape Growing

BY Cliff Ohmart

Sustainable winegrowing viewed from different perspectives

How "natural" is farming?

I often ask the above question in lectures for two reasons. First, it gets people's attention. The second is it usually gets people thinking about farming from an ecological perspective. The downside of asking it is many farmers get really annoyed because they see farming as the ultimate natural process.

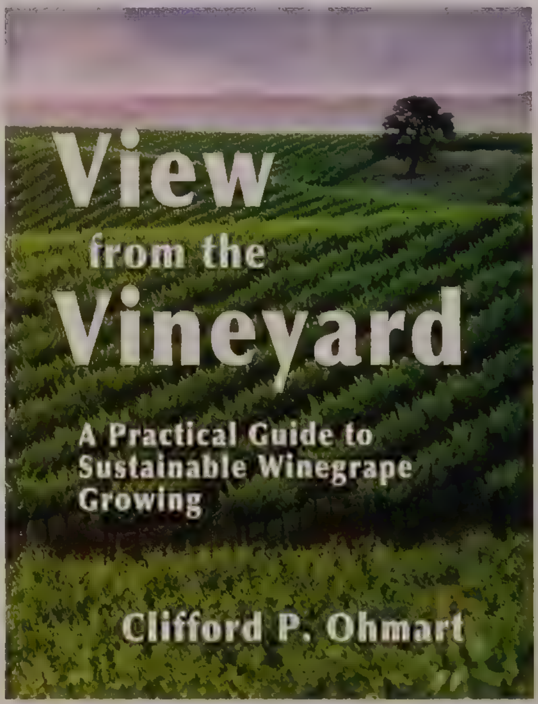
If one sees people as a part of the ecosystem, which I do, then farming is as natural as anything else people do. However, some consider people as separate from other animals and therefore either separate from the ecosystem or at least a special case. Where farming fits all depends on ones' perspective.

Humans began in this world as hunter-gatherers, living off the land just like all other animals. They were omnivores, meaning they ate pretty much anything they could get their hands on and digest properly, both plant and animal tissue. Since it was the first form of survival an argument could be made that it was the most natural one. Although in some situations hunter-gatherers had a very big impact on the environment. For example, the aboriginal tribes in Australia regularly burned large areas of the continent to create an environment more conducive to producing the food they desired.

Success of the hunter-gatherer lifestyle was completely dependent on vagaries of the local climate, which, in turn, affected local plant and animal populations. In some years food was plentiful but in others it was not. At some point humans began to cultivate crops because it was a more reliable way to ensure a regular supply of food. As soon as they gave up the hunter-gatherer life style to stay put and grow their own food and producing more than they could consume in one sitting, they left what might be considered a more natural way of life and headed down the less than natural road of farming.

From this perspective farming can be viewed as an unnatural act for several reasons. For one thing, virtually all of the crops we grow, whether organically or conventionally, are varieties that are exotic. That is they are not native to (did not evolve in) the area in which they are now grown. In some cases this has had dire consequences.

Take winegrapes, for example. Virtually all varieties that are grown in the U.S. evolved outside North America, primarily in Europe. It turns out that grape phylloxera, an aphid that evolved in North America on native grapes, devastates European grape varieties because they have no natural immunity, not having evolved in the presence of this insect. The only way to successfully grow European grapes in areas where phylloxera occurs is to grow them on North American grape rootstock. There are many other cases like this in agriculture throughout the world where a crop was imported and it proved to be susceptible to a local insect or disease.



Not only are we growing crops where they are not native, but we have also altered plants as result of centuries of genetic selection so they provide the maximum amount of the plant part we desire, whether it is the root, flower, fruit, or leaf. This, too, is unnatural.

For example, fruit and roots that we grow and consume are packed with many more nutrients than their ancestors had. This is true even for heirloom plant varieties. The consequences of this genetic selection have had a dramatic effect not only on our evolution but also on certain species that feed on these plants.

Not only do these plants provide us with more nutrition in the parts we eat, they also are more nutritious to the insects and diseases that feed on these plant parts. We have improved the plants for our benefit but also, ironically, for the benefit of these other species which we call pests. In many cases, we have created our own pest problems.

Another way farming can be viewed as an unnatural act is by realizing that regardless of the size of a farm, whether it is a 10,000-acre corporate giant or a one-acre organic patch, natural habitat was destroyed when it was established. Land had to be cultivated, whether by hand or by machine, and pre-existing plants had to be removed. Furthermore, no matter how diversified is the resultant farm, it is still more ecologically simplistic (less bio-diverse) than the natural habitat it replaced.

Because farming alters an ecosystem

from its natural state, it has significant environmental impacts. Some perceive significance of these problems and their causes differently from others and therefore develop different ways of reacting to them.

Two human characteristics that can get us into conflict are denial and the need to feel superior to others. I often encounter them when reading about or hearing people discuss the impacts farming has had on the environment and society and the two major farming paradigms. I am referring to the debate between organic and conventional farming.

Some organic farmers and their supporters view it as the most sustainable way to farm while some conventional growers say: "my family has been farming for several generations; now that is what I call sustainable!" In both cases they are not admitting the fact that farming has a significant impact on the environment no matter how it is done.

Where does this leave us?

I think we all need to admit that no matter how naturally one farms, it is still a process that highly modifies the environment in which it occurs. In other words, it leaves an environmental footprint. Nevertheless, it is subject to ecological processes and should be thought of and evaluated in ecological terms.

Farming is not really natural or unnatural. It is something that we have to do to produce food and we should endeavor to practice it using strategies that are as sustainable as possible. ■

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FREE RUN

Early morning coastal fog at Peay Vineyards in Sonoma County.

To be Au Naturel?

BY Nick Peay,
Winegrower, Peay Vineyards, Cloverdale, CA

Growers will not often admit to having powdery mildew in their vineyards, but I will say it: We had powdery mildew in our 51-acre Sonoma Coast vineyard in 2011.

In the pursuit of delicacy, complexity, and balanced acidity, we push the envelope for where we can get our varieties to ripen and this also ramps up the mold and mildew pressure. This is even more the case since we avoid the arsenal of nifty chemicals that conventional growers use.

I say nifty because as a former student of organic chemistry, I truly appreciate the genius of these new wave "soft" chemicals: chemical compounds isolated from nature and given a tweak to their structure – a methyl group added here, or an amine added there. These synthesized chemicals have a very narrow target specificity and supposedly have quite low impact on the environment as a result, but they are one or two steps removed from the "found" chemistry that would allow them to be termed organic.

At Peay Vineyards, we use the "found" stuff either organic chemicals like sulfur, or microorganisms themselves like *Bacillus subtilis* or *Bacillus pumilus* (fighting microbes with microbes!). But Mother Nature has been especially challenging in 2010 and again in 2011 and I was sorely tempted to use one of the synthesized chemicals, which by the way, work better, hands down, no question about it.

However, once you have powdery mildew, no synthesized chemicals can get rid of it. Only two fully organic chemicals work as eradicants: potassium carbonate and horticultural oil. We have been applying them throughout the vineyard and think we have it under control. The additional work (coverage is critical) made the 2011 summer busier than normal, however. It feels good, doesn't it, to be able to say that we are not only organic but "natural" winegrowers, right? Hmmm …

We were asked to participate in a documentary about natural wine/winemaking but our schedules failed to align with the out-of-state filmmaker on his brief passes through our neck of the woods. While the nebulous definition of the term could benefit from an array of testimony from various self-designated practitioners, I was hesitant to lend legitimacy to a group making a variety of wines from a wide range of regions with few exemplary wines to date.

More importantly, the attempt to constrain winegrowing to a very limited, somewhat arbitrary set of tools that predate modernity under the self-righteous cloak of naturalism slightly offends me. What is okay and what is verboten? You gotta love the invention of the microscope, a winemaker's most important tool, no? How do you feel about refrigeration? Electricity?

Certainly there is invasive technology like the spinning cone (a flow-through centrifuge) and reverse osmosis filtration that is widely used in our industry. We oppose these and other technological innovations that manipulate wine, heck, we do not even like pumps!

However, when we can no longer move the wine with gravity, we push wine with inert (oxygen-free) gas. How is that inert gas made? With a giant fractionating column which distills air into its component gasses. Modernity intrudes, yet again. This practice is not on any list of forbidden practices that I could find, however (which reminds me of the PETA activist rallying in a pair of leather sneakers.)

Which brings me to another nit to pick with this whole "natural" thing: While rolling back the clock, where do you decide to stop? Before the discovery of the importance of the use of a little SO_2? Before the discovery of the flavor contribution of (moderate) new oak in wine? Before the revolution in packaging (glass and cork?)

In their defense, I think natural adherents concentrate mostly on additives. What about the U.S. Department of Agriculture (USDA) list of approved legal additives to wine? The USDA affirms that the ingredients on the list are safe for human consumption.

The uber-health conscious might want to know, however, what is ultimately in the glass of wine they are drinking. Most are fining agents and enzymes which settle out and are not in the final product, or are yeast vitamins and nutrients and are not in the final product, either.

Then there are ingredients that alter the flavor of a wine. Megapurple and its ilk? Yikes! Fining changes the flavor, for the better sometimes, but always removes more than its target often resulting in a lesser wine. Extractive enzymes, which create flavors similar to ones found when picking too late or with fruit that is cooked on the vine, alter the flavor in a way that is not expressive of place.

Oak flavor from barrels is technically not on the USDA or natural wine list but it is an additive. Okay, oak is a sticky one – I definitely think it is okay to add the non-vineyard sourced nuances that carefully balanced quantities of new French oak contribute to most of our wines. But oak must never over-shadow the expressions of the place where the grapes were grown. It must serve as a support to enhance the already existent, inherent character of the wine. That is the crux for us.

We think the most interesting wine

PEAY

Varieties:
Pinot Noir, Syrah, Chardonnay, Viognier, Roussanne, Marsanne

expresses the place and conditions in which those grapes are grown. As a result we add no ingredients except for SO_2, which we do not need very much of as you will see below.

However, some "natural" winemakers have an automatic aversion to additives, and though I sympathize with their concern, I think their rationale is incorrect. At Peay Vineyards we are not minimally interventionist because of dogma. We do not add stuff because we do not need to.

If your goal is to make balanced wines and you have found the right place to grow grapes, then you do not need acid from a bag or heaps of SO_2 or whiz bang technology. Your pH will be low so not very much SO_2 will be needed to maintain the microbial upper hand. Of course, the whole notion that this beverage needs any supplementary flavoring agents is anathema to us.

The emphasis for natural winemakers should be as it is for us: Great wines are made in the vineyard (heard that one before haven't you?)

Tastes may differ, but we are not doctrinaire and do not feel it is our job to tell you what to like. Rather, these 20th century traditions inform our palates and we choose to adhere to these traditions. Each innovation can have a dramatic effect on fundamental wine flavor. While we reject many recent technological innovations, neither do we prefer to revert to ancient history. Ad absurdum, some active hand must pick the grapes, throw them together, and encourage them not to become vinegar. Otherwise, they are just bird food.

The growing and harvesting of grapes and the winemaking process should be a flexible, goal-oriented process. The reason we are farming and winemaking is to make world-class wine; that is our goal. We are proponents of a conscientious interconnectedness with our natural environment and understand that everything we do in farming and winemaking has an impact. You might think of us as inhabiting that philosophical intersection between the First Law of Thermodynamics and the Tao. ■

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Continued from page 28

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Grape juice and wine yeast

Continued from page 14

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Mike Stevens (left) and Brian Carter (right) outside tasting room.

Unusual choices pay off for boutique Washington winery

BY Elisabeth Deffner

Where passion intersects with calculated risks — that is where Brian Carter and business partner Mike Stevens operate Brian Carter Cellars (Woodinville, WA), making unusual financial, marketing, and production decisions that are helping the boutique Washington winery not just to survive, but to thrive.

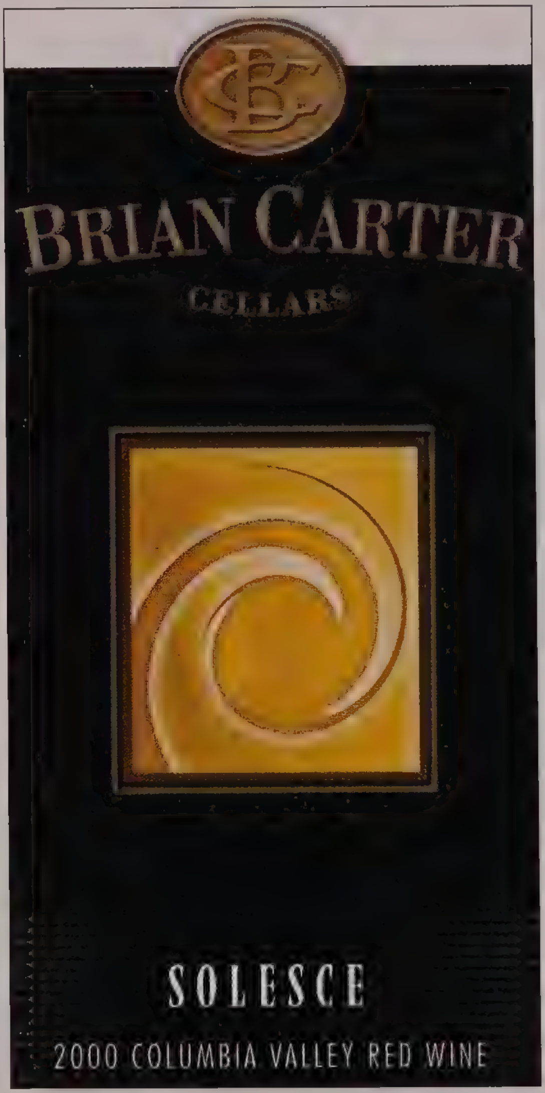
Carter's passion for wine dates back to a wine appreciation class he took while earning a microbiology undergraduate degree at Oregon State University — an elective that ended up directing his career choice. After graduation he enrolled in the UC Davis enology program, but work opportunities — including his first crush job at Mt. Eden Vineyards in 1978, and a coveted position at Chateau Montelena in 1979 — prevented him from completing his thesis.

But nothing prevented him from steering his career in the direction he wanted it to go — north. Carter moved to Washington State to work with Paul Thomas, who was planning to open a winery that would create wines from grapes and other fruits. It was an early professional exposure to creative problem solving — a skill Carter relies on now that Brian Carter Cellars (BCC) is creating its European-style blends.

BCC is a natural outgrowth of Carter's enthusiasm for experimentation, and 18 years of experience at Apex Cellars, where he was consultant, winemaker and, later, co-owner. Apex is also where, in 1997, he crushed the first Brian Carter Cellars vintage, a Cabernet-based Bordeaux-style blend called Solesce. He sold the 100 resulting cases under the Apex bond, an arrangement he maintained for several years — selling BCC wines both in the Apex tasting room and through Apex's distributor in Washington State.

By then he was eager for a change — and he believed the market was, too. "I wanted to really focus on different blends and break free from the varietal thing," explains Carter. That is how he has built the BCC name, and other unusual business choices have helped the boutique winery thrive, even in the economic downturn.

In May 2011, he and Stevens celebrated the fifth anniversary of Brian Carter Cellars in Woodinville, WA — a fitting time to look back on the unusual production and marketing choices they have made, and how they have maintained a positive cash flow by making those choices work.



BRIAN CARTER CELLARS BOTTLINGS

Oriana: 55% Viognier, 29% Roussanne, and 16% Riesling.

Tuttorosso: 69% Sangiovese, 19% Cabernet Sauvignon, and 12% Syrah.

Byzance: 61% Grenache, 21% Syrah, and 18% Mourvedre.

Le Coursier: 39% Merlot, 34% Cabernet Sauvignon, 14% Cabernet Franc, 8% Malbec, and 5% Petit Verdot.

Solesce: 50% Cabernet Sauvignon, 34% Merlot, 7% Petit Verdot, 5% Cabernet Franc, 4% Malbec.

Corrida: 66% Tempranillo, 17% Merlot, 11% Cabernet Sauvignon, 6% Garnacha.

Unusual choice #1: Blends

Creating European-style blends clearly makes BCC unique, but Carter was not thinking that far ahead when — as both winemaker and partner at Apex — he began working on Solesce, which would become the first BCC vintage.

Carter had already done some experimenting at Apex, where his wine sometimes contained close to 75% of the principal grape variety — verging on, but never crossing over to, a blend rather than a varietal wine.

"When I had a barrel of Cabernet and a barrel of Merlot right next to it, I thought, 'Why not try to blend these things together and see if it makes it better?'" he recalls. "The French haven't been doing it for several hundred years without a good reason."

Blends can certainly be a delight to the palate — but that does not make them easy to sell. "It is somewhat new to many American wine consumers," says Stevens, noting that U.S. wine consumption is grounded in varietal wines. This makes education a major factor in BCC's sales.

For example, when guests come into the tasting room looking for a mouthful of Chardonnay, staff may explain

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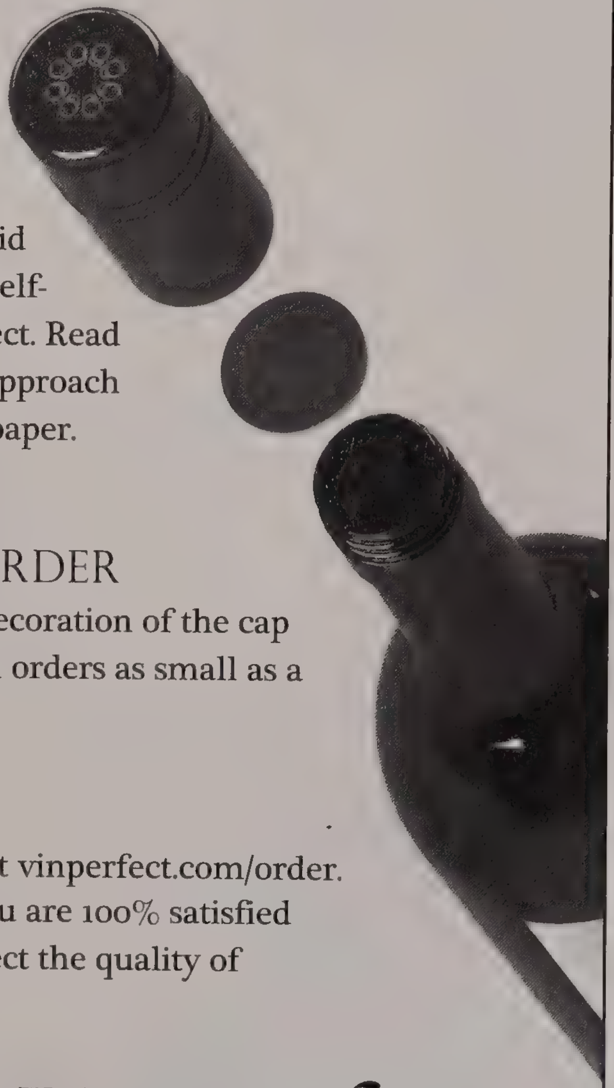

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that there is none to be had there, offering referrals to nearby tasting rooms that stock varietal wines, while sharing the mission of BCC — most often enticing the guests to taste some BCC blends. From that point, bottle sales are fairly easy.

It is a system that works well when there is the capability of addressing consumers directly, Stevens says. "The challenge is when Oriana [a white blend] sits on a shelf and there is nobody around, and the consumer asks, 'What is an Oriana? A wine varietal? A pretty name?' It is markedly different, the experience you get in a wine-tasting venue as opposed to at your grocer, or even in a wine shop." (See sidebar for details of BCC core wines.)

Then there are restaurant wine lists, which are most often categorized by grape variety — for example, Chardonnay, Merlot, and Syrah (with a section toward the back, perhaps, for blends or "additional reds" or some other catchall category) — though there is a growing trend to classify wine lists by flavor categories, which can make it easier for diners to locate a BCC offering. Some restaurants organize their wine lists in still other ways (one locally focused Seattle restaurant that stocks BCC's Tuttorosso includes it in a category headed "Northwest Red Wines").

In working with restaurants and wine shops, education is a major factor in sales. The partners stay in close contact with sommeliers and restaurant staff in the greater Puget Sound area — sometimes hosting special events to explain the BCC mission and offer tastings — and with store owners who stock their wines.

Carter and Stevens have traveled to Southern California and Arizona to touch base with several Total Wine and More stores, which have begun to stock BCC vintages, and connect with Seattle residents who have winter homes in the desert — a built-in market that could help start a Southern California/Arizona demand for BCC wines.

Despite the challenges, there is also good news: According to the Nielson Company, sales of red blends have increased in 2010-11 compared to 2009-10 in every price range — and more than 43% in wines priced $15 and higher, which is where consumers find BCC wines.

In 2011, Carter expects to produce about 5,600 cases of wine from slightly more than 90 tons of 19 grape varieties. (That is down from a high of 8,500 cases in 2008.)

"Sales have increased every year," Carter says simply. "We are very optimistic — but we probably have more inventory than we would like to have."

In addition to steering clear of a varietal grape bottling, Carter also sells behind the market — helping consumers get the best wine-drinking experience. "The best wines [most of us have] ever had are wines that have some age on them," he says. "I want to encourage more Americans to do that part of the winemaking process: bring the wine home and cellar it. I am trying to give them a little bit of a push in that direction."

Most BCC wines are 22 months in barrel (Solesce is 28 months in barrel because it has a lot of Red Mountain fruit "that takes a while to come around," Carter explains). After bottling, it is another year before the wines head to market. "It really pays off," Carter adds. "The wine is already starting to really open up and develop complexity" when it is in consumers' hands.

The downside of this philosophy is increased warehousing time and expense — and the consumer's perception that BCC may have had trouble selling a particular vintage, explaining why BCC 2007 Abracadabra is on Total Wine and More shelves, for instance, when other winemakers are selling 2009 vintages. But for Carter, there is no question that increasing the artistic maturity of his wine is a benefit that outweighs the drawbacks.

Unusual choice #2: Tasting room only

Brian Carter Cellars has no vineyards — nor does it own a brick and mortar winery. Carter admits that it is his "lifetime ambition" to build his own winery, but he is not moping because he was not able to start construction in the Woodinville Village, a proposed 21-acre condominium community that is on indefinite hold now that the condominium market is so soft. "We would be sitting there in the middle of a big field surrounded by scotch broom," he says wryly.

"In some ways we are disappointed," admits Stevens, "but in other ways we are fortunate too." He notes that some wineries have found it difficult to maintain production numbers and simultaneously pay the mortgage during the economic downturn, and some of the vineyards that have supplied grapes to BCC have likewise been unable to weather the recent economic storm. But BCC — which does not even own the property on which the tasting room stands — was able to develop new product over the past couple of years (including a port-style dessert wine and Trentenaire, a Bordeaux-style blend exclusive to wine club members), rather than wrestling with a choice of paying the mortgage or buying grapes.

Currently, BCC wines are produced in Brian Carter Cellars bonded space near the tasting room, that opened up after Columbia Winery production was moved to eastern Washington. BCC stores bottled wines at the Columbia Winery facility.

"It is a big savings, not having capital tied up in winery and vineyard ownership," says Stevens — but the downside is that tasting room visitors do not have the "total experience" of smelling the faint odor of fermentation and glorying in a view of winding rows of grapevines. It is a lack that he, with a deep interest in destination tourism, feels keenly — and Carter is right there with him.

"I am very sensitive that I do not have a beautiful winery surrounded by vineyards," Carter notes. "We do not have that sense of place, and we want to keep that connection alive. We are nothing without our grapevines."

To counter that lack of "sense of place," BCC works all the harder to give visitors a full wine-tasting experience. Each quarter, BCC hosts six wine club parties — in addition to a June solstice party and September grape stomp that makes use of vineyard partners' grapes that would otherwise have been dropped as part of the pre-harvest cluster thinning.

"We are going to be doing more barrel events," Stevens adds, noting that the tasting room sometimes hosts small "blending events" for various populations, including wine club members, area sommeliers, and staff of restaurants that list BCC wines.

Unusual choice #3: Departure from vineyard country

When the BCC tasting room opened in the Hollywood District of Woodinville, dominated by the historic Hollywood Schoolhouse, it was the only one there. Now within 200 yards are more than 20 tasting rooms, with a new one opening every few months.

According to Cynthia Dasté, executive director of the nonprofit organization Woodinville Wine Country, 25 tasting rooms have moved into the area over the last 24 months, bringing the total to more than 80 wineries and tasting rooms in the wine country — which welcomes an estimated half-million visitors per year. Tighter family budgets have resulted in fewer people trekking to eastern Washington wineries, Dasté explains, so the tasting rooms are coming to western Washington residents.

Carter is not sure whether the pie is getting bigger, or the slices are getting smaller; but he does know that each of the last five years, tasting room performance has improved over the previous year.

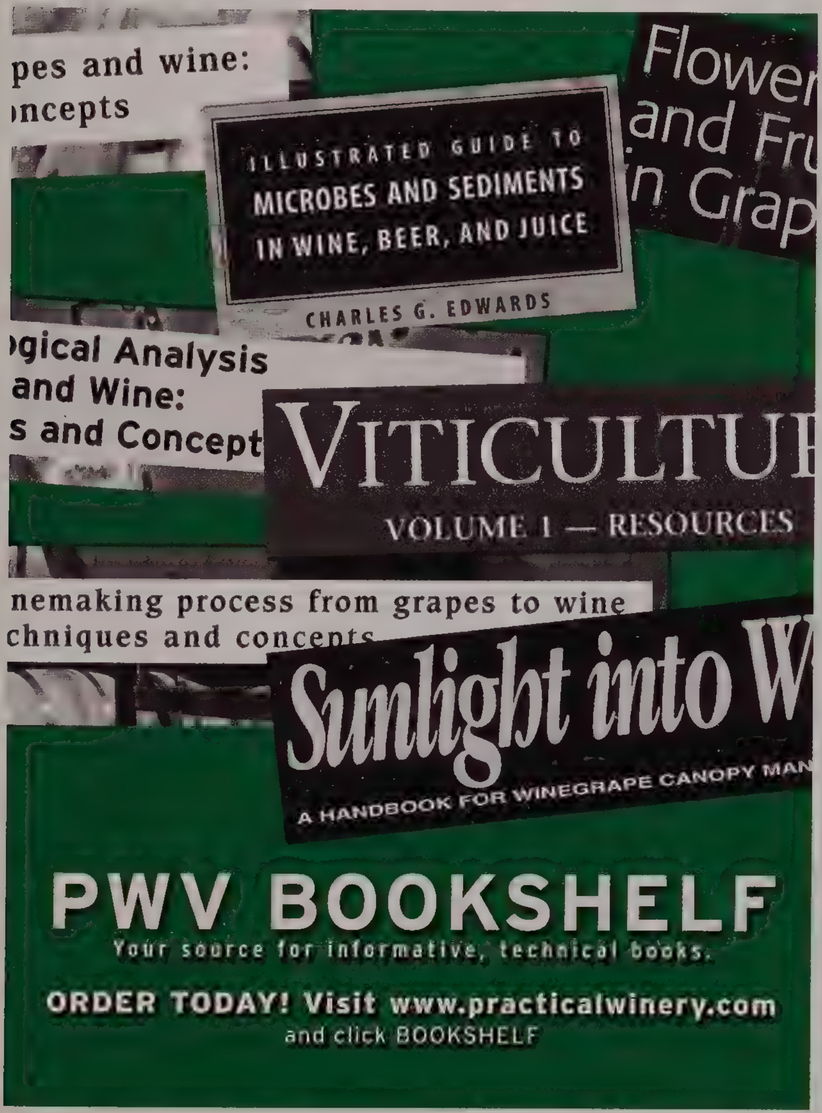
Currently about 60% of BCC wines are sold through the Woodinville tasting room, resulting in more than 60% of the revenue, of course, since the wine is higher-priced than it is when sold through a distributor. "A good chunk of [those sales] includes our wine club," adds Carter — about 40%.

The three-level club has a total of about 800 members. Club Vignette, the lowest level, is closed to new members; members of mid-level Club Vivant are allotted 16 bottles of wine per year, twice as many as Club Vignette members. Members of Club Savant, the highest level, pay a $1,200 annual membership fee that includes several perks, foremost among them a winemaking or grapegrowing seminar for two.

"Savant Club members are our most educated and most enthusiastic Brian Carter Cellars supporters," says Carter. "Moreover they are our ambassadors who take our wines and brag about them to their friends."

Unusual choice #4: Focus on locals

BCC wines are still heavily distributed in Washington (about 80% of restaurant placements are in the greater Puget Sound area). Their wines are also distributed in Oregon and South Idaho, and available in Total Wine and More stores in 10 states in the southwest and southeast. But keeping in mind the hand-selling, "educa-



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tional" factor, and the many awards BCC wines have won in Washington State, the partners do not plan ever to let their focus on Washington slip.

Carter does not enter many competitions — admitting that BCC wines have not "set the world on fire" by collecting 95+ point ratings — though the wines consistently score in the low 90s, including a 90-point rating from *Wine Spectator* and Robert Parker for the 2007 Byzance, and 93 points for the 2007 Corrida from the *Wine Enthusiast*. In addition, year after year, BCC vintages receive major awards from *Seattle* magazine — a publication BCC's core market is likely to read and pay attention to. BCC's most recent lauds from *Seattle*: best Rhône blend in the state over $20 for the 2007 Byzance and best general proprietary blend under $20 for the 2007 Abracadabra.

At least one Woodinville winery has established a second location in downtown Seattle. BCC is considering the same, getting even closer to its core market, and doubling opportunities to educate consumers about blends. "We have visitors come into our tasting room every day and taste our wines for the first time; you can just watch their eyes get bigger," Carter says. "They say, 'They are all different, they are all good.'

"I would much rather hear that from an average wine person than in a competition. That is our core of people there."

Unusual choice #5: Name game

BCC wines have elegant and evocative names — but as Stevens notes, they are more likely to pique a consumer's curiosity than to inspire: "Just what I was looking for!"

What *is* an Oriana? The BCC white blend's name is an Italian woman's name, or Latin for "golden," Carter explains.

Solesce — from the Latin for "sun" and "essence" — is BCC's flagship wine, Carter's first Bordeaux-style red.

Tuttorosso, Italian for "all red," is a super Tuscan-style blend.

Corrida (Spanish for "bullfight") is a Spanish-style red blend.

Byzance, French for "Byzantine," is a Rhône-style red blend. Carter originally found the expression "C'est Byzance" in a French slang dictionary which translates into "decadently good," and he liked Byzance's connotation of Eastern spice and decadence — but he did not anticipate that consumers would struggle to pronounce it. "We get 'Beyonce' a lot," he admits. "Our comeback is, 'Yes, it has nice legs, a full body, and it sings.' We make the most of those moments."

L'Etalon (French for "the stallion"), a Merlot-based Bordeaux-style red, has recently been the subject of some legal wrangling, as another winery presented Carter with a stack of legal documents explaining why he cannot use the name anymore. Newer vintages of the wine now go by "Le Coursier," French for "the steed."

Label designer Stephen Black, who has known Carter since his Apex days (Black designed the Apex labels), and his wife Lynn have designed the labels for the whole BCC product line, from the colorful abstracts that make the core wines stand out on the shelf, to the Magritte-style rabbit-and-wine-bottle label for the Abracadabra red and rosé, to the simple, classic label for the port-style dessert wine. They also created the BCC logo.

Taking their cue from Carter's passion for blending, the Blacks blended images, media, and colors to develop labels for the core wines. "That seemed like a natural jumping-off point for us — a series of blended imagery to reflect the blended wines," explains Stephen. "The focus and objective was to reflect that expertise of blending; each illustration has an element of blends."

The Blacks also look to the wine names for inspiration. The Oriana label, for example, incorporates gentle golden curves that might put one in mind of the female form. The label for Le Coursier naturally features the silhouettes of horses, while Tuttorosso

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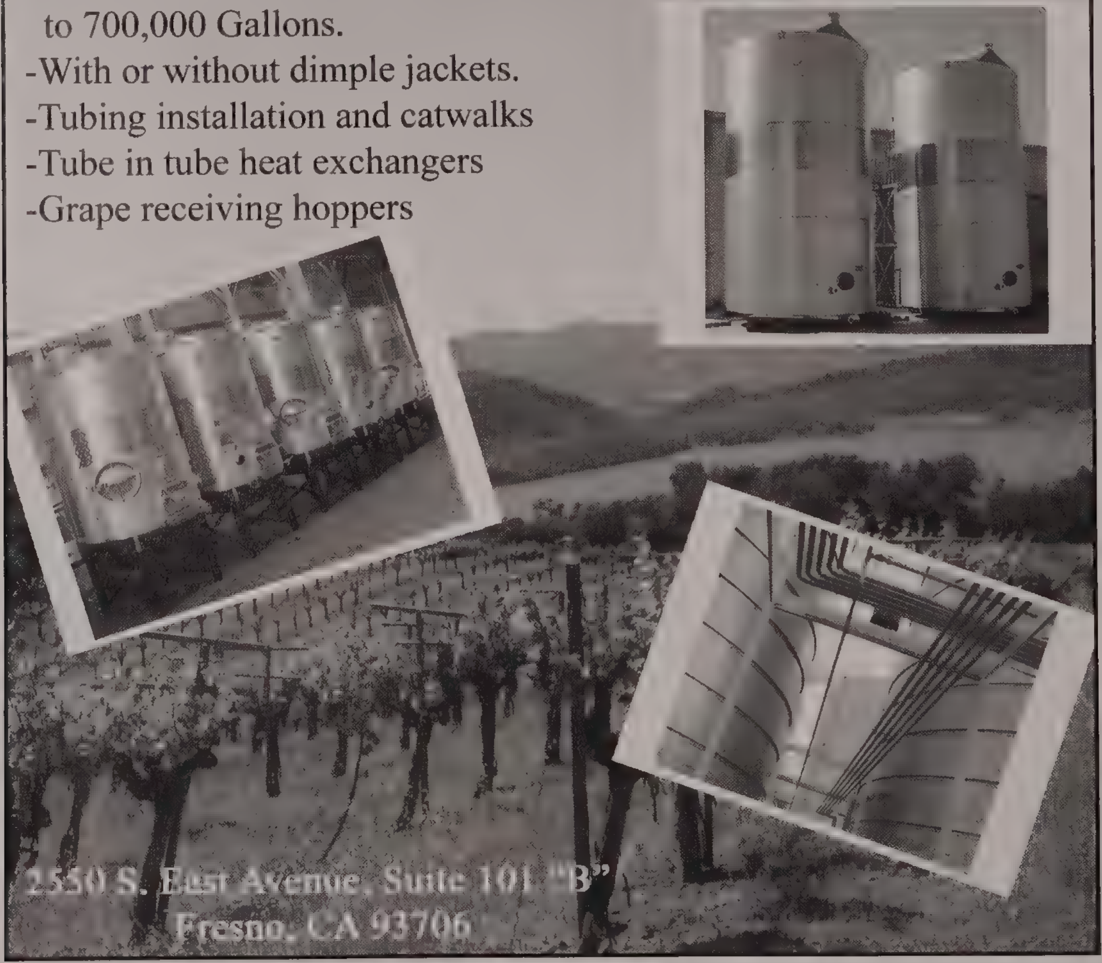

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Traditional marketing is a time-consuming, but necessary, addendum to the hand-selling that Carter and Stevens agree provides the surest guarantee of a sale.

Their website (www.briancartercellars.com) is comprehensive and user-friendly, but Stevens frets that it is not updated often enough, or that it offers enough enticement for repeat visitors. "Video tasting notes would be a wonderful thing," he speculates. "But who writes the script? It is wonderful to take advantage of those things if you have the time and resources to devote to it."

The pair is testing the social media waters. BCC has a Facebook page, and is working with Urban Dealight to sell tasting room vouchers to visitors at a discount. "If they do not come in, I am not out anything in terms of time or whatever the promotion includes," Stevens explains. "If they do, it is up to us to create an experience for them that makes them want to buy more wine, join the wine club, or both."

In other words, BCC is using standard marketing techniques to help increase opportunities to hand-sell. In the same way, Carter and Stevens determined that they were giving away too many bottles of wine to fundraisers who requested them — and not getting any return on their donation. They narrowed their participation parameters — only contributing to fundraisers for educational programs and children's healthcare organizations — and in addition to donating a bottle of wine, they donate a certificate for a tasting.

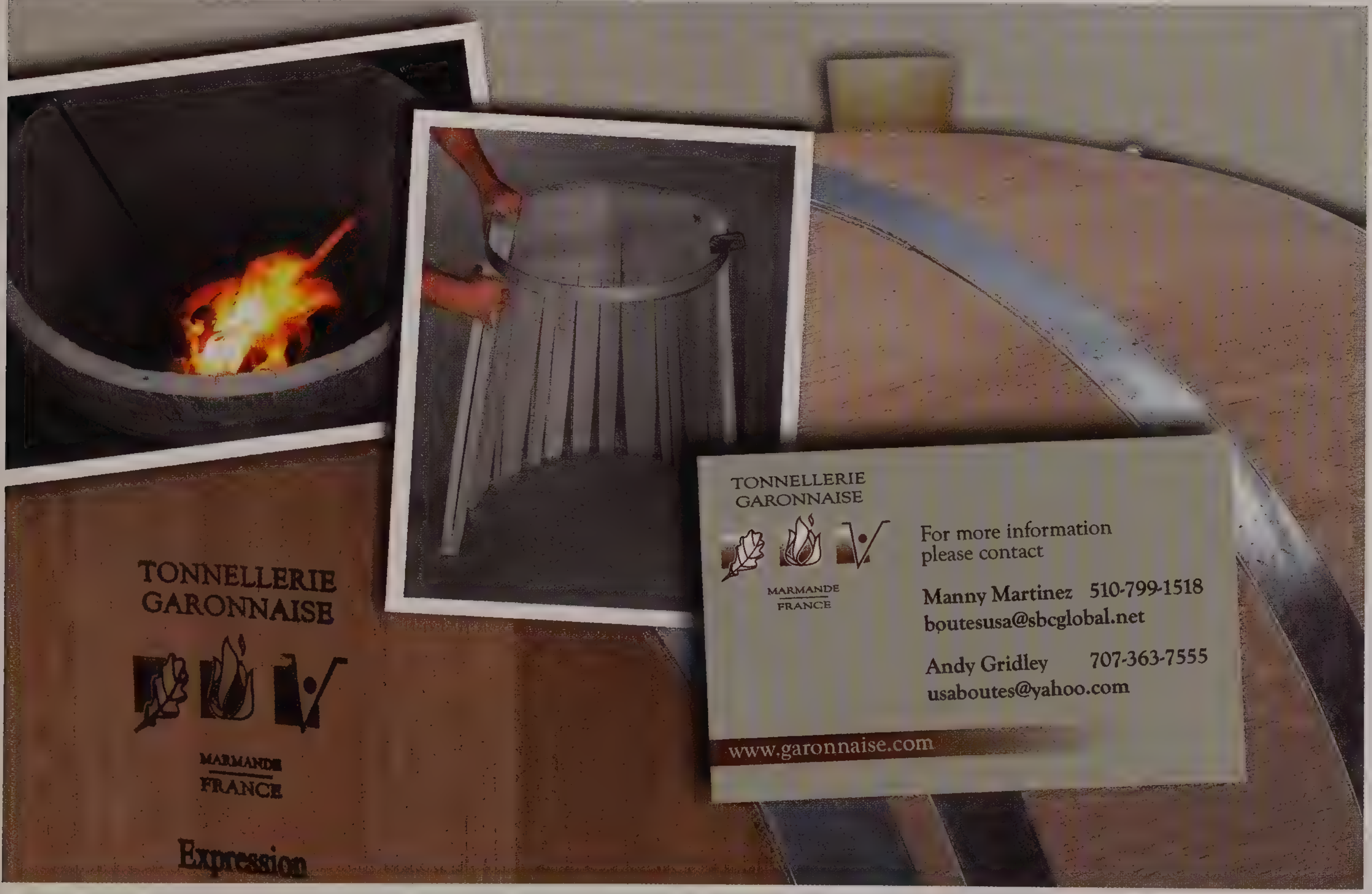
"Get people in the door," says Stevens. "That's been huge.

"Get folks in the door, share the story, share our passion. That usually leads to a good outcome for everybody."

bears a label that is indeed all red.

The Abracadabra label is a world apart — just as the wine itself is not one of the BCC core wines, nor in the same price range, nor the same exact blend each vintage (more on that later). The imagery is sharp and photographic, but the placement — a wineglass emerging sideways from the right side of the label, a wine bottle soaring out of the left side of the label — is surrealistic; and the Blacks purposely referenced surrealist painter René Magritte by placing all elements (including the white rabbit, a nod to the "magical blend" that Abracadabra is) in front of a door that opens onto a blue sky filled with cumulus clouds, a Magritte motif. Here again, Stephen Black adds, "the name drew the design."

"Those good-looking labels give people an excuse to pick up the bottle," says Carter. But he and Stevens continue to refine the face of BCC wines, so to speak. For instance, newer vintages will feature on the front of the label — rather than on the back — the percentage of each grape variety included. Newer vintages of Abracadabra will incorporate the BCC logo into the label, which was not the case before.



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Label design is critical, the Blacks note — especially in a retail environment, and perhaps especially for blends like Carter's, which can be tough to locate in stores that may display stock by grape variety. "We want to make sure that the consumer is attracted to the package," says Lynn Black. "If we can get the consumer to scan the retail aisle and pick up that bottle because an element of the design attracts them, the sale is more than halfway there."

Unusual choice #6: Make the rules — then break them

One of the top questions Carter hears at the tasting room is, "Why do you make blends?" "The main reason," he replies, "I like to." But that does not mean he has not taken a hard look at the market, too. "I think it is an idea whose time has come in Washington State," he says. "Blends are fun for me and a rising trend."

The BCC marketing manager has urged a shift in the blend percentage of grapes — some of the BCC core wines, such as Tuttorosso, with 69% Sangiovese, and Corrida, with 66% Tempranillo, require but a slight increase in the percentage of a particular grape to be categorized as a varietal wine, rather than a blend, which might result in easier sales. But Carter has resisted the temptation. "We are trying to focus on blends," he says firmly.

But in keeping with his tradition of bucking tradition, Carter does offer the occasional grape variety. "One" is a vintage made of one variety grown in one vineyard — a complete departure from Carter's focus on blending grape varieties from multiple vineyards (he has at least two sources for every variety, helping insure his blends against potential disasters like irrigation pump malfunctions or the freeze that hit Washington State in November 2010). He makes a One vintage only when a grape variety is particularly outstanding — and the resulting bottles are so few (perhaps 100 cases) that they are generally offered to club members only, on a first come, first served basis. (Thus far he has released a 2007 Sangiovese and a 2007 Malbec.).

Abracadabra is another departure — a red or rosé blend at a lower price point ($15 to $20 range, as opposed to the $30 price point of most BCC wines) that varies with each vintage. Abracadabra is blended from barrels remaining after blending other core wine blends.

"I like to call Abracadabra the magical blend that happens every year," Carter says. "One year it may be more Cabernet-dominated, the next year it might have more Sangiovese. I source grapes from high-quality vineyards and use high-quality barrels on all the wine, so it is always very good — it is just a little more variable and fun, a little bit more of a surprise."

Creating new wines is not very high on his to-do list, although he is speculating about another white blend, and Opulento — a port-style dessert wine — was released in 2010. "I would say that our long-term plan is to not make a lot of dramatic expansion in different wines, but to keep the core we have," he says. "Our biggest thrust at this point is to work on the out-of-state markets; we are also comparing the expense of that with opening up a second retail location."

Outlook

A decade ago, Carter notes, he was worried about the future of the wine business as he observed the graying of the customer base. Today, he sees a lot of 20- and 30-somethings in his tasting room — and they are the population he credits with his boutique winery's ever-increasing success. "They have done the 'varietal' thing, and are ready to move on to the new exciting blends that are out there," he observes.

Carter is right there with them — and not only because he has a passion for blending. "I really see that is where the market is going," he concludes. ■

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SUCCESSFUL TASTING ROOM

Alpha Omega Winery achieves big DTC sales

BY Craig Root

Winery owners might ask, "How can reading about a successful tasting room on Highway 29 in Napa Valley teach me how to make my own operation more profitable? I am a little guy and in another state." However, several tasting room practices discussed here apply to any successful operation.

Two of the principals at Alpha Omega (AO) founder/managing partner Robin Baggett and general manager/Winemaker Jean Hoefliger — shared what has led to their substantial success. How did a winery in Rutherford [Napa Valley], purchased six years ago — with a tiny and tired tasting room, develop into a very profitable entity? They produce 10,000 cases of wine per year.

Robin started in the wine business when he founded Courtside Cellars and Tolosa Winery in the San Luis Obispo area. [Disclosure: I was the tasting room consultant for Robin for both Tolosa and Alpha Omega.] AO currently entertains more than 40,000 visitors per year and has a wine club of more than 4,000 members, and its sales are up 28% over 2010 despite the recession.

I sat down with Robin and Jean in early September 2011 to learn about their success.

CR: Besides making world-class wines that are drinkable even when young, Jean is one of the most knowledgeable GM/winemakers in the business about direct-to-consumer (DTC) sales. Did you hire him for those skills?

Robin Bagget (RB): Frankly no. We knew that we wanted to do as much DTC as possible; we are at 90% now. However, first we wanted to find a great winemaker with a great personality.

CR: Jean, I know from working with you that you are very hands-on. For example, when I have done staff training, you have always been there the whole time which is — I can tell you — rare for someone in your position. What was your greatest challenge in learning DTC?

Jean Hoefliger (JH): Service and how to please people, not only with wine but also with their experience in our tasting room. You have to provide outstanding hospitality at all times.

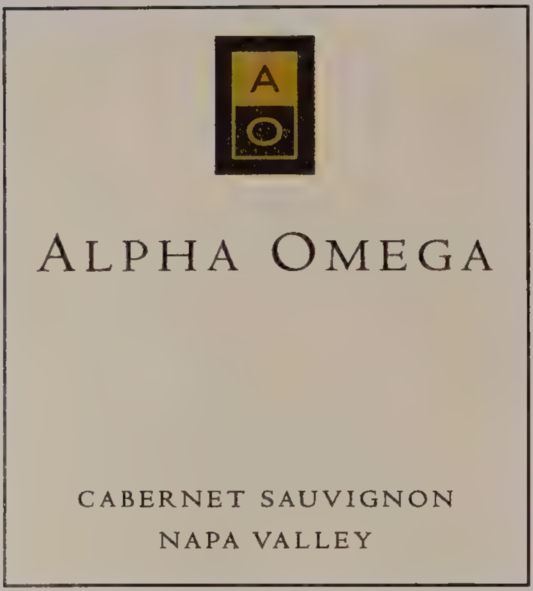
RB: Plus, we have had you, Craig, involved from day one. Moreover, I learned a lot about DTC from my time at Tolosa, so I was able to impart some of that knowledge to Jean.

JH: One thing that I have observed is that it is hard to do better when you have already been doing well.

CR: You are doing great because, at your request, one of my associates mystery-shopped your winery on more than one occasion, and your operation has always earned extremely high marks. I think that the only negative we found on the last mystery-shop was that the soap

The Single Vineyard Barrel Loft seats 12 guests. There are 50 barrels of premium red wines much of the year except at blending and bottling. The room has a cellar temperature of 50°F and 70% humidity. While most wineries with private seating in their cellar or cave do not offer apparel to keep guests warm, Alpha Omega provides logo jackets so guests feel comfortable during the tasting to stay warm.

Alpha Omega offers guests a "Folio of Private Wine Experiences" in this room for enophiles with discerning palates and an immense love of wine. To better understand the master blending techniques of Alpha Omega's winemakers, guests first experience Bordeaux-style blended wines from historical award-winning vineyards throughout Napa Valley. Following this experience is a barrel tasting of AO single vineyard wines such as Beckstoffer, To Kalon, Dr. Crane, Las Piedras, Georges III, Missouri Hopper, and Stagecoach Vineyard on Atlas Peak. The tasting of these wines which are 100% handcrafted, natural yeast fermented, in 100% French Oak barrels, unfiltered and unfined is an experience not to be missed in Napa Valley.



in your rest rooms was so "perfumey" that it lingered on visitors' hands and spoiled the bouquet of the wine they were tasting.

JH: Right, and we really appreciated that information.

RB: I think that a big part of our success is that most of our visitors are referrals from other tasting rooms, concierges, and limo drivers.

CR: How does that work?

RB: Senior staff are each given a dedicated list of other businesses, particularly tasting rooms, which they regularly contact. When appropriate, they are allowed to make the contact with a gift, such as a bottle of wine for a concierge. They own that list, so I think they take a personal interest in staying in touch.

CR: I find that food is a great gift for tasting room staff. I have been in the business long enough that I can tell you most people who work in tasting rooms are "chow hounds." When you show up with a dozen brownies (or cheese and bread), they definitely remember you.

RB: We have also become friends with these folks. I like to barbecue so we will host limo drivers or concierges or other tasting room staffs. I personally cook for them. I believe that this involvement on our part is crucial in maintaining a high-profile friendship.

CR: You know Gary Eberle at the very successful DTC Eberle Winery in Paso Robles. He does the same thing. I think that visitors or staff from other tasting rooms are really touched and impressed to see the president or owner cooking for them while they all schmooze and drink wine together.

Plus, I sincerely feel that you, Robin, are one of the most affable people I have met in the wine business. I know that you're not just going through the motions. When the owner is so friendly, it sets a tone for the operation.

RB: Thank you. We schedule at least one barbecue party per month. We entertain a variety of groups, such as the Napa Valley Vintners, and they send us great referrals. We have a separate room for limo drivers to relax in, with complimentary non-alcoholic beverages, while they wait for their clients to finish their tasting.

JH: We have different tasting experiences — everything from traditional counter tasting to small private tastings to larger private tastings for groups of 10 to 15. I think that being able to tailor your tasting experience to the specific visitors helps with referrals, especially concierges who want an enhanced visit for their clientele.

CR: I am a big believer in the idea that the most important component of a tasting room is the staff. How do you approach staffing? Please describe your training.

JH: We agree about the importance of staffing, but we rarely advertise for staff. Instead, we are constantly searching for new staff. If we get a waitress or a bank teller, that's great. We will try to recruit them.

JH: Our training is extensive. We use written materials and shadow training, and I personally spend time with them. A lot of the sales training we do is through the seminars you have done for us. We also use mystery shoppers in order to ensure a high level of performance.

RB: I have always played for teams — whether in college baseball or the wine business. I really make sure that part of the equation is always in play.

JH: I am also keenly aware that working in a tasting room is extremely draining. I learned that from working the market as a winemaker.

CR: In essence, it is performing arts: it can be tiring to be "on stage" for a number of hours.

JH: Exactly.

CR: Your tasting room manager, Rick Patton, is really good. What makes a great tasting room manager?

RB: They have to be multi-talented, which is rare. They have to achieve sales and budget goals, be a numbers person, and then turn around and be as charming as possible. The number-one trait I look for is keeping the staff focused on sales and performance — which is harder than it sounds.

JH: They have to do so much while also dealing with the stress of crowds.

RB: It is a very difficult job, both mentally and physically.

Another idea I learned from you, Craig, is to never be understaffed. It kills sales and referrals. Plus, when we are successful, we share with the staff. We have a daily sales goal, and 10% of any sales over that goal goes to that day's staff. We close at six and they are more than happy to stay a little later when they can share in the sales.

CR: What about remodeling? You have come a long way from the tiny tasting room in the corner of the original building.

RB: One tactic we used was to remodel in quadrants. That way, we always had some kind of tasting room open. DTC is 90% of our sales so we can never afford to be even partially closed.

CR: What are the secrets to building your large wine club?

RB: We really pay attention to retention. For example, we have one club event per month for the members. We also make wines only for the club. Right now we have a Malbec/Zinfandel blend for the wine club.

JH: Another appealing concept is that whether it is a club event or just members who drop in, we offer fantastic hospitality.

I recently asked a wine club member at a party: "How many members do you think we have in our wine club?" She replied: "About 200." That says a lot about the extra attention we give wine club members.

What's more, when we go on the road, we have wine club member events in other cities.

RB: We also have a boat that can accommodate up to 20 people, and we use that for big buyers, charity auctions, sommeliers, and concierges. We primarily cruise the USS Alpha Omega on the Napa River and San Francisco Bay.

CR: How about tasting tips?

RB: We have up to two greeters who can direct people to the least crowded areas. We have six areas: the terrace, tank room, main room with an island counter (like the bar in the old sitcom Cheers), private rooms, picnic grounds, and our by-appointment-only loft room.

CR: You rarely have a second row of customers — which kills sales and wine club sign-ups?

JH: Correct.

RB: We have up to 16 staff members on really busy days (Saturday/Sunday/holidays). We also try to have a "back-pocket wine" on hand — something special that we can pull out for wine club members and big buyers

JH: We offer barrel samples, and this is where we get a lot of visitors who join our futures program.

RB: We find that e-mail blasts help sales. We keep it short and sweet and when the customer hits "reply," it goes to a specific staff person. That staffer takes ownership of that specific customer.

JH: We have 1,000 members in our buyers' club. This is for people who do not want to be in our automatic shipment club, but commit to buy two cases per year. They receive the same perks as auto club members.

CR: How about budget control?

RB: We really focus on that. Every department is under budget for the year so far.

CR: Any other tips?

JH: Having private and public tasting is important. We get a lot of referrals from tasting rooms that only offer private tasting because they want to send customers to a like-minded facility.

As I left the winery, Robin showed me some of the private tasting areas, particularly their wonderful loft area. Robin explained: "We had a barrel fermentation room which wasn't being used throughout much of the year. We decided that a good use of this space would be to create a loft for private tastings. Of course, the barrels in this room add a natural ambiance to the tasting area. The one factor we have to account for is keeping the room at 50o in order to ensure wine quality, but we provide shawls and jackets for guests if they are uncomfortable."

I mentioned how I thought daily incentives for staff were the best practice because the prize was right in front of them compared to quarterly incentives. Robin replied, "Watch this!" We went into the main room and he asked Rick what the daily sales target was, and where they were at by 3PM. Rick knew both figures, and that says it all. ■

With 30 years of experience in winery tasting rooms, Craig Root teaches Tasting Room Design and Management at UC Davis and spends the first Saturday of every month working in a busy winery tasting room, averaging one wine club sign-up and two tours per shift. Visit: www.craigroot.com

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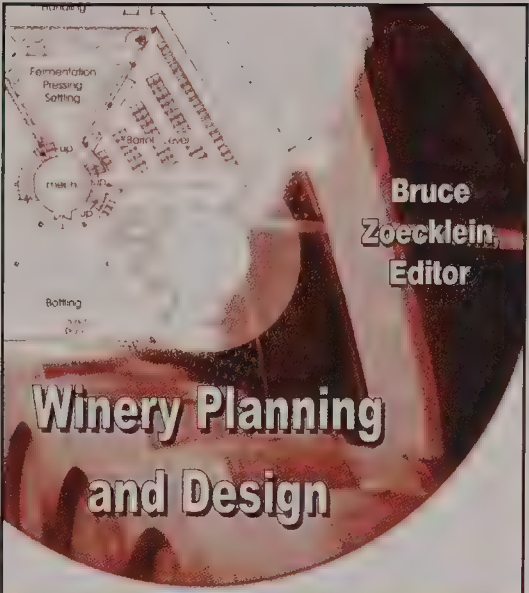

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FOUR WASHINGTON WINERIES

BEST AND WORST BUSINESS DECISIONS

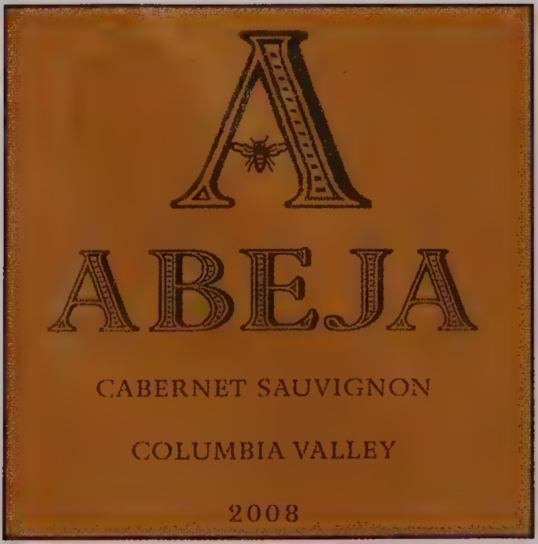
BY **Thomas G. Dolan**

Many business owners do not like to share their secrets of success, for fear their competitors might use them. They do not want to talk about their mistakes, because those might be embarrassing. But four Washington winery executives share both what is good about what they have done, and their regrets.

Abeja

"I would say my best business decision was to become a founding winemaker of a property in Washington State," says John Abbott (owner of Abeja winery in Walla Walla, WA). "It was a great move for me personally, and for my business career."

Abbott acknowledges that moving to Washington and becoming part of the fledging wine industry there, was not his decision alone. He previously worked for the Chalone Wine Group, which sent him to Washington with the title of general manager, and a mandate to start a winery. When Chalone was in the process of being acquired by another company, Abbott decided to strike out on his own.



"Thanks to my experience with Chalone, I went through a very good learning curve," Abbott says. "Probably the most important thing I learned was how I would define my vision of what makes a wine unique."

Abbott relates that in 1993, Abeja became the seventh active winery in Walla Walla. It was not until 1997 that the state had 100 wineries. Today there are more than 700 wineries in Washington.

"It was all so new, there were not a lot of practices in place. There weren't farmers focused on grapes alone, just a lot of small farmers who happened to grow grapes along with their other crops. It was all so new. There was so much experimentation to do, and so much to learn. People from all walks of life were involved in the industry. To be a founding winemaker, to create a brand from the ground up in that environment, was really fun."

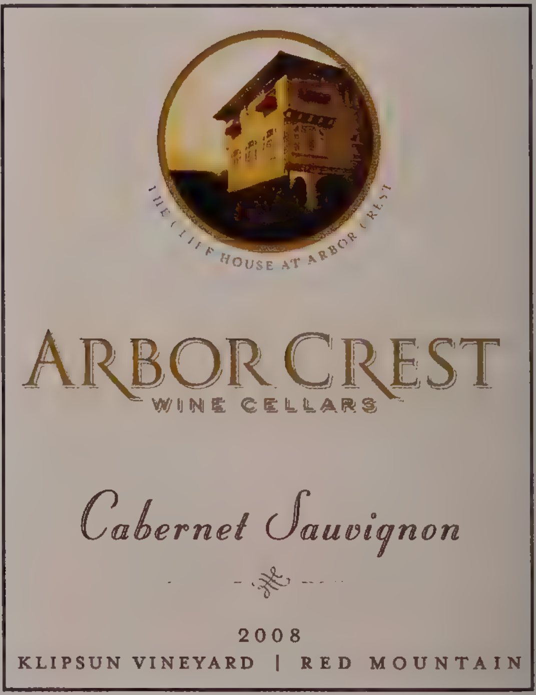
Abbott does not recall a really bad business decision as such, "but if I have any regrets, they would be that, as much as I learned while working for the Chalone Group, there were many talented winemakers, and I did not fully utilize their knowledge and skills when I had the chance. Working for a publicly-held company, I had access to a free sounding board with many incredibly talented people from whom I could have learned a lot more. I went to college for winemaking, but what you can learn from your peers is so much more than you can learn from books."

In 2010, Abbott produced about 4,000 cases and Cabernet Sauvignon is the flagship wine. Wine production is 75% red and 25% white wine.

Arbor Crest Wine Cellars

Older still, and probably one of the first wineries in the state, is Arbor Crest Wine Cellars (Spokane, WA), founded in 1982. The original owner, after running it for 18 years, passed it on to his niece, who runs it with her husband. The couple is Jim and Kristina van Loben Sels Kristina is owner, CFO, and winemaker (seven years of winemaking experience in California), and Jim is general manager and viticulturist.

Jim van Loben Sels explains the company's worst decisions were made before they took over the winery in 1999. They do not necessarily mean that the original owner made bad decisions at the time — only that by 1999, certain practices were outmoded and had to be changed. This led to the good decisions, the couple reports, three key ones having to do with quality, price, and packaging.


THE CLIFF HOUSE AT ARBOR CREST
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"We were considered medium- to low-end," Jim says, "we rebranded and took steps to enhance quality that starts in the vineyards. Instead of buying by the ton (tending to maximize yield rather than quality), we started contracting for tonnage per acre. With tonnage/acre contracts, we were able to remove an element of variation with some flexibility in determining how the grapes were grown."

"Flexibility included setting the canopy density to allow for more natural light exposure and irrigation, when to apply or not apply water to achieve optimal varietal character and flavors near harvest time."

"We increased our price, to $10 to $15 per bottle," recalls Kristina, "we lost some customers due to the shift in price but, on the flip side, we gained new customers that were excited about the increase in wine quality."

Yet, though the quality was improving, and the price points to justify same, the intended success did not immediately follow, even though the new wines were getting good reviews. Some 30% to 40% of the brand is on grocery retail shelves, but sales, instead of improving, were actually starting to decline slightly.

"It took about one year of getting feedback from distributors and grocers," adds Kristina. "There are so many variables in consumer preferences, it is hard to pinpoint just what they are looking for, and what you are failing to give them."

It turns out that what the consumers were looking for, and not finding, was, literally, the look. The label icon was a family heirloom, which did not mean anything to people outside the family, and the dark label with the heirloom blended in on retail shelves, so that a consumer standing six or seven feet away would not notice anything distinctive.

A new look, explains Kristina, utilizes a white background against which stands out a new icon, and indicates a location that the previous one did not, a house atop a 450-foot cliff. The winery is located on a cliff with a strikingly scenic view of Spokane Valley, an area which is a travel destination on its own. The couple decided to take advantage of the scenic location.

The van Loben Sels produce 20,000 cases per year, putting Arbor Crest in about the top 25% of Washington family producers.

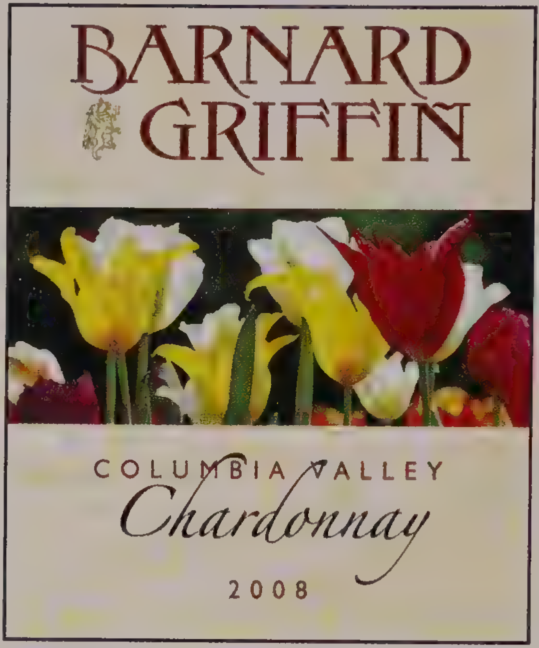
"We expanded the retail component of our business, to 30 musical events per year (Thursday and Sunday), 40 plus weddings, and another 30 private events," Kristina adds. "That first year, we made Sunday evening a picnic night with music. About 40 people came. Now, 12 years later, on average, more than 1,200 people show up on Sunday evenings, when the winery as such is closed. We have taken an offbeat approach to selling wines, and have made it one of the most successful parts of our business.

"In 2012, we will start a Summer Pops program with the Spokane Symphony."

Barnard Griffin

Barnard Griffin has been in Washington even longer. Rob Griffin, after graduating from U. C. Davis and working 18 months in the California wine industry, joined Preston Winery (Pasco, Washington) in 1977. Griffin was winemaker/general manager at The Hogue Cellars (1983-1991). He and his wife Deborah Barnard started Barnard Griffin in Richland, WA in 1983, and he became full-time Barnard Griffin winemaker in 1991.

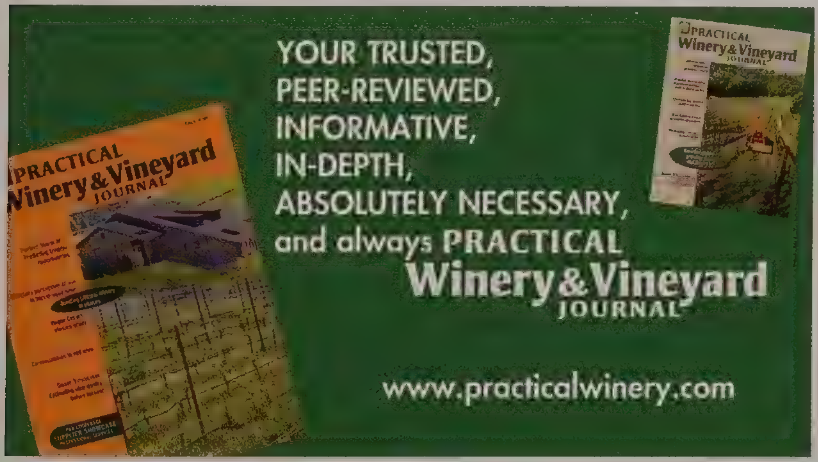
"The best business decision we made was to create a brand with a great deal of quality built into it, but to keep it at a reasonable price to create a large and loyal customer base. "Rather than increasing our bottle prices, we reacted to opportunities to do more of what we did well, but with increased volume."



Barnard Griffin became 50% partners in two vineyards that provide Chardonnay, Cabernet Sauvignon, and Merlot, while contracting with other vineyards. "Rather than buying high quality fruit in small lots, we buy 30- to 40-ton lots," Griffin says.

Barnard Griffin produces about 75,000 cases (65% white and 35% red wine) per year, and Griffin estimates they are in the top 10 Washington wineries as producers. "There are some wineries who sell more by the gallon, bond to bond, but we are one of the larger who sell direct to consumers, and one of the largest family wineries.

"We were winning wine competitions from the start, so could have sold a higher-priced wine, but we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determined to stick to our business model. Although the winery does sell a limited amount of wine in the $30 to $50 range, the bulk of the wines we sell direct to consumers are in the $8 to $16 range.

As a forerunner among Washington wineries, Griffin acknowledges that, "entering the market with enough volume to achieve economies of scale would be very difficult to do today, with the market so crowded."

Turning to the flip side, Griffin adds, "Ironically, our best decision was also the worst, in that when prices are artificially high, we do not reap the benefits of that boom. People like to pretend there is a correlation between price points and quality, but in all applicable studies, this is shown not to be true. Even highly educated consumers can not pick price points without prior knowledge."

Yet, on balance, Griffin says that he and his wife are more than happy with the decision they made to increase volume rather than price, for when the economy is down, as currently, it is the pricey wines that suffer, while they are able to still maintain their large and loyal customer base.

Latah Creek Wine Cellars

Mike Conway, owner/winemaker of Latah Creek Wine Cellars (Spokane, WA), has been making wine even longer, for 29 years, and he has taken an entirely different approach. He has remained determinedly small, a family business employing no one else in winemaking and principle operations positions except himself, his wife Ellena, and, most recently, their daughter Natalie.

"From a work standpoint, it would be nice to have another winemaker, but not from a cost-standpoint. A decision to get larger would require more employees, different equipment, and much more capital investment."

Over the past three decades he had occasions to make "lots of decisions," most of which he is content with, since they have to do with not only staying small on principle, but also paying for his purchases in cash. "It is very easy for a winery to spend thousands of dollars in equipment, which is very hard to pay back," Conway says. "Our approach has always been very conservative. We operated for 15 years with a used and very small corker, a semi-automatic 10-spout filler, and a hand labeler. We made this equipment work until we had the cash to buy new fully automatic equipment."

Along these same lines, Conway says his pay-in-cash mentality "has given us more flexibility with growers. For instance, even though we have a 20-ton contract for Merlot, one year we were able to buy only 10 tons, which helped us keep our inventory in line. The fact that the growers know we pay for our grapes on time gives them an incentive to be flexible."

The ethic of "small is beautiful" is not uncommon in Washington State. Conway estimates that his production of 16,000 cases per year puts Latah Creek in the top 40 wineries in the state, the majority of which are family businesses. Conway contrasts the majority of these family businesses, who want to remain small, with the large corporate and investor-driven wineries who want to be large and distribute nationally.

"With today's technology, we can produce a quality wine with a small operation in a way which also allows us to have a life over and above that of the business."

Not surprisingly, Conway says his worst decision came when he veered from this idea. "When we were not too far into the business, we decided to distribute on the east coast. It seemed like a good decision at the time. But it did not take us very long to see it would become an expensive proposition. What happened was that we were dealing either with small distributors who could not do much, or large ones, in which we were just one in a book-sized listing of wines. They wanted a mandatory presence, there on a regular basis, with all the air travel and hotel expenses, and take time away from my winemaking. We knew it would not be too long before we were trying to sell products without making any money.

"We pulled back, and found we could save money, and still become more popular, and sell more wine locally. Today nearly 1/3 of our annual production is sold direct to consumer through our tasting room. This accounts for more than 1/2 of our annual income."

By correcting this mistake and eliminating the far-away distribution, the Conways were able to turn this into a positive. "Previously we had a meager number of gift items for those who visited the winery," Conway adds. "But Ellena had the idea to develop a full gift shop, selling not only wines, racks and other wine paraphernalia, but also gourmet foods and a wide array of other gift selections. This greatly increased traffic." ■

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Washington State breaks three-tier mandates

BY Angela Logomasini, Ph.D.

Washington State voters approved initiative 1183 on November 8, 2011. The ramifications of this initiative are complicated, which is perhaps the most accurate thing anyone can say regarding the future business relationships between Washington State alcohol producers, wholesalers, and retailers.

Washington voters have dramatically altered the rules governing those relationships by overhauling the state's alcohol law. Initiative 1183 has effectively cracked open the state's three-tier system for wine sales, while privatizing the government-owned and-operated spirits business. Three tier-mandates remain in place for beer, which is largely distributed via franchise agreements between suppliers and distributors, with exceptions for small breweries.

The Washington State Liquor Control Board has set up a transition page on its website, describing the initiative and its implementation timeline.

How the agency will eventually interpret the many provisions remains unclear, yet there are some exciting possibilities to explore. The following is not a full-blown legal analysis, but instead provides a few details on some of the *possible* interpretations that the liquor control board might make.

Led by Costco — which spent $22 million promoting it — and supported by restaurants, supermarkets, and other retailers, the initiative includes a host of new freedoms for retailers and producers who want to skip the traditional distributor tier.

Specifically, it allows distilleries to sell direct to retailers (wineries and breweries already had this right under existing law), allows retailers with 10,000 or more square feet of space to sell spirits, authorizes retailers and producers to warehouse wine and spirits, permits retailer to sell to other retailer for on-premises consumption sales (i.e., restaurants and bars), and removes laws that prevented discounting.

The initiative took effect on December 8, at which time grocery stores had the opportunity to obtain a retailer reseller endorsement from the liquor control board in exchange for an annual fee of $166 per store. This endorsement allows these retailers to sell wine to restaurants, bars, and other retailers with licenses to sell wine for on-premise consumption. Accordingly, wineries may sell to these stores and have the stores market and sell the wines to restaurants and bars under prescribed limits.

However, the law states that each sale between retailers is limited to 24 liters. This provision sounds restrictive, but there appear avenues around it. In particular, it does not limit the number of sales that a retailer may transact with any other retailer during a given day. Accordingly, a retailer may simply have to break large sales down into dozens of transactions all conducted minutes apart.

The initiative allows retailers and producers — such as restaurants, supermarkets, wineries, and distilleries — to open warehouses under cooperative or association-based arrangements. It is not clear how the liquor control board will interpret these provisions, but it raises exciting possibilities.

For example, might wineries form associations for the purposes of retailing and self-distributing their wines in Washington and even globally?

Producers within the newly privatized spirits industry will have to decide how their products will be distributed. If they choose to use wholesalers to distribute their products they may limit their options to comply with state franchise laws. Accordingly, spirits producers will have to consider seriously whether working with distributors makes sense. The fact that franchise laws grant brand exclusivity and are nearly impossible for producers to terminate may make this avenue unattractive for many spirits producers entering the market. As a result, distributors may find it difficult to break into a lucrative, newly privatized spirits industry.

This is an unfair and ironic result of the laws that alcohol wholesalers themselves had supported and lobbied in favor of for decades. They simply will not work in a more modern, freer market. It is time for distributors to support franchise law reform that make distribution contracts voluntary agreements with terms that are fully negotiated by the parties rather than being set by statute.

Clearly, the new law is not perfect. The best reform would put all players on a level playing field where all have a fair chance to compete, enter into voluntary contracts, and engage in free exchange. That is how markets work in other industries, and they operate more efficiently than government-managed alcohol markets. But politics has made that impossible for now.

Still, it appears that Washington State could become one of the freest alcohol markets in the U.S. for wine and spirits — a trend that could eventually spread to other states. Such prospects may send shivers down the spines of entrenched wholesaler interests. But it is good news for everyone else. ■

Angela Logomasini is a senior fellow at the Competitive Enterprise Institute and blogger at winepolicy.com.

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WINTER 2012

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Photo: Trione Winery, Cloverdale, CA; tanks by Paul Mueller Co.

AAQUATOOLS

AaquaTools has been providing water-driven cleaning tools to wineries for more than 20 years. AaquaTools' success is a result of the ability to fill sanitation voids with high-pressure, low-flow, specialty cleaning tools that clean quickly with minimal amounts of water.

AaquaTools, Inc.
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AaquaTools' AaquaBlaster series of self-propelled cleaning tools are used to wash barrels or tanks. Robust and reliable, the AaquaBlaster successfully cleans with hot water (up to 185°F) and high impingement.

AaquaTools' HotCart portable propane-fired hot water generator/high pressure washer provides hot water (up to 180°F) for domestic or high-pressure applications. Fired by clean burning, energy-efficient, "tankless technology" and, coupled with a KEW Poseidon pump and motor assembly, HotCart outperforms dirty, odorous, diesel-fired pressure washers.

The KEW Poseidon is a perfect driver for all water-driven tools. Designed as a cold water electric-pressure washer, the Poseidon receives hot water (up to 185°F) while delivering up to 2,750 psi at 5.5 gpm.

AaquaTools offers ozone and steam generators, water-driven floor cleaning attachments, and many more effective cleaning tools.

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Napa/Sonoma: 707/558-9100
Sacramento: 916/635-2922
e-mail: info@AaquaTools.com
website: www.AaquaTools.com

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KEY TECHNOLOGY

Key's crush pad equipment includes stainless steel receiving hoppers, cluster sorting tables, post-destemmer sorting tables with MOG separation systems, and optical sorters. These modules can be used separately or integrated as a system and are available in a range of sizes that handle from 1 to 10 tons of grapes per hour.

Key's Grape Receiving and Inspection Platform (GRIP) combines a receiving hopper with a vibrating cluster-sorting table. The unique receiving hopper accepts an entire half-ton bin at once, and meters clusters, which frees the operator to handle other tasks. The cluster-sorting table has an adjustable speed control to display grapes evenly for thorough inspection.

Key's post-destemmer sorting table includes a MOG separation system that automatically removes insects, loose skins, raisins, shot berries, stem jacks, petioles, leaves, and more.

Optical sorters use color cameras to inspect grapes and remove MOG based on accept/reject standards defined by the winery to control the quality of the must going to fermentation tanks, while reducing labor costs.

Key will introduce an affordable new optical sorter for MOG removal, ideal for wineries producing 5,000 to 50,000 cases per year, at the Unified Wine & Grape Symposium.

KEY®
TECHNOLOGY

With 62 years as a leading supplier of world-class equipment for food processors, Key Technology is applying their expertise to help wineries improve quality while reducing labor.

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PAUL MUELLER COMPANY

When it comes to fine winemaking, each operation is dependent on quality equipment.

Established in 1940, Paul Mueller Company designs and manufactures stainless steel processing systems and equipment reflecting the superb craftsmanship and strict attention to detail that make its products desired among prominent winemakers.

Mueller® tapered wine tanks, available in insulated or single-wall versions, have a novel design that allows the grape cap to wedge into the upper part of the tapered shell, making it easier to re-submerse, which in turn enhances the extraction process.

MUELLER®

Mueller fabricates and field-installs equipment for all phases of winemaking, including fermentation, storage, champagne, de-juicing, and pomace removal tanks; rotary fermentors; Porta-Tanks®; Accu-Therm® plate heat exchangers; falling film chillers; all-stainless-steel wine barrels; Temp-Plate® heat transfer surface; process piping; modular systems; and integrated systems.

Mueller will custom design and build the specialized equipment required for any winemaking process. Ask about Mueller field fabrication capabilities. When a project is too big to ship in one piece, or is located in tight quarters, Mueller Field Operations can make it work.

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website: www.muel.com

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SKOLNIK INDUSTRIES, INC

Skolnik stainless steel cooperage is designed to meet the special needs of winemakers in all stages of fermentation, maturation, and storage of fine wines. Skolnik has a long and proud tradition of providing winemakers with stainless steel drums of high quality, durability, and design.

Skolnik's wine industry customers look to stainless steel cooperage to supplement oak barrels in key stages of the winemaking process. Stainless steel offers unique and unsurpassed qualities for preserving product integrity and purity — important considerations for why stainless is a key tool for winemakers.

Stainless steel cooperage is:

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- Virtually maintenance-free;
- Sized from 5 to 55 gallons;
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Skolnik is a full-service manufacturer of steel containers and accessories. Every Skolnik container is thicker, heavier, and stronger than industry standards — a commitment made to customers for more than 75 years.

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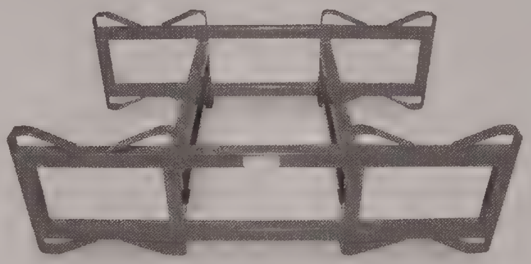
4900 S Kilbourn Ave., Chicago, IL 60632
tel: 773/362-1913; fax: 773/735-7257
e-mail: jason@skolnik.com
website: http://winedrum.skolnik.com

PLEASE SEE SKOLNIK INDUSTRIES AD, PAGE 86.

WESTERN SQUARE INDUSTRIES

Western Square is the world's leading manufacturer of barrel racks. New and old customers from Turkey and France to Napa, CA and Montgomery, PA turn to Western Square to protect their wine barrels. The safety of employees and wine is one of the most important considerations wineries must make. Western Square's seismic support system and rack replacement program help make sure these investments are secure.



The Double Bar Rack is the new industry standard two-barrel topping rack. The Low Profile Rack has a 4-inch forklift opening and is stable for stacking six barrels high, with a lower center of gravity.

The Four-Barrel Rack has great stability, with a 7-inch forklift opening, and is the top recommendation for 6-barrel high stacking. The Half Rack is designed for the bottom tier where head space is a consideration, and is pallet-jackable from all four directions.

Because wine barrel racks have a limited life of productive service, Western Square, through its sales force and inspection service, is suggesting winery owners replace aging racks. The cost of employee safety is immeasurable, but the cost of a replacement rack can be less than 6% of the wine it protects.

For more information, contact:
Western Square Industries
Trygve Mikkelsen
1621 N. Broadway, Stockton, CA 95205
tel: 209/944-0921; toll-free: 800/367-8383
website: WesternSquare.com

PLEASE SEE WESTERN SQUARE AD, PAGE 45.

WESTEC TANK & EQUIPMENT

Westec Tank & Equipment has 31 years of industry-leading technology and experience, providing custom-designed and manufactured stainless steel tanks, catwalks and stairways, OxBoxes, and equipment for wineries. For a large winery or a small startup winery, Westec offers one-on-one expertise and insight from helpful, knowledgeable, and experienced professionals.

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Westec is on the forefront of the newest equipment designs. Equipment is technologically advanced, well-built, easy-to-maintain, safe, and aesthetically appealing. For wineries needing design advice and guidance, Westec can help plan enhancement and expansion projects.

Westec's reputation for honest, reliable, and friendly service has been built by meeting and exceeding expectations, year after year.

With a total height of 5 feet, Westec's new dimpled cooling tank jacket covers the majority of the tank for complete temperature control. The seamless tank shell makes the tank easier to clean and allows for larger, more effective cooling jackets. The new tank jacket can be used on any size tank to optimize the heating/cooling capabilities, and potentially reduce plumbing costs.

For more information, contact:
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Joe Belli, Jim Belli, Mark McDowell
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e-mail: info@westectank.com
website: www.westectank.com

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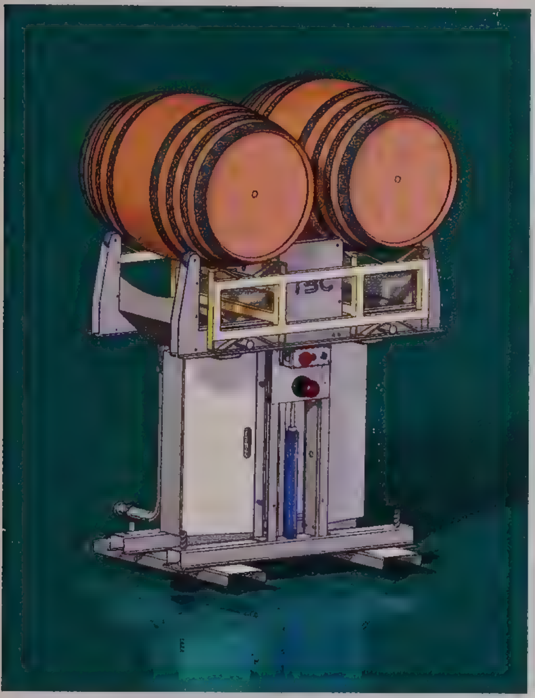
TOM BEARD COMPANY

The **TBC2-ST** from Tom Beard Company is the safe and efficient way to steam barrels, a stand-alone unit that delivers a measured amount of steam, automatically inserts a bung to establish a vacuum for an adjustable time period, removes the bung, and rinses the barrels with hot, cold, or ozone-charged water. Rinse water is contained for controlled disposal.



The **TBC2-ST** is loaded by forklift, and operates via programmable controller. There is no need for workers to be in the vicinity of the steam at any time. Available with or without steam generation.

The Tom Beard Company is focused on creating machinery that will stand the test of time, use the least amount of water, and generate a minimum of wastewater. From 2-barrel and 4-barrel washing machines, to half-ton bins and cellar equipment, Tom Beard Company has it covered!

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tel: 707/573-3150; fax: 707/573-3140
e-mail: jmendoza@tombeard.com
website: www.tombeard.com

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CHART INC.

Chart Inc. is a leader in liquid nitrogen (LN_2) delivery systems for oxygen displacement. Chart has worked exclusively with winemakers to integrate and optimize technology on screw cap bottling lines, to reduce headspace oxygen, and extend shelf-life of wine while preserving taste.

Chart's technology has consistently provided 90%-95% reduction in headspace oxygen content, and 59% reduction in total package oxygen, compared to traditional gas nitrogen sparging. This consistency allows winemakers to confidently control the use of sulfur dioxide while maintaining an acceptable free sulfur dioxide level.

One winemaker reported dissolved oxygen content less than 0.03 ppm without compromising the fresh fruit taste of the wine, with Chart's dosing equipment.

CHART®

Chart has a complete line of standalone dosing systems to accommodate a variety of bottling line conditions and speeds. A precise dose of LN_2 is injected into the headspace prior to capping. The liquid dose warms and turns into 700 parts of gas, displacing O_2 from the headspace. With more than 1,000 dosing systems installed, Chart has a wealth of application-specific knowledge.

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website: www.chartdosers.com

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BUCHER VASLIN NORTH AMERICA

Bucher Vaslin is a perfect press and reception equipment company for any winery, offering a complete line of Bucher Vaslin equipment, along with the Costral brand of bottling equipment – all developed to accommodate small, medium, and large wineries.

The Bucher Vaslin press models are 5 HL to 750 HL capacity, with an intuitive and fully programmable PLC to provide perfect press extraction according to winery need and grape variety.

Bucher Vaslin Delta reception equipment includes the successful Vistalys® optical sorter. This technology has been extended to the smaller model Vistalys R1 with improvements in programming for sorting white and red grapes.

The Delta Oscillys destemmer was introduced for the U.S. 2011 vintage. The Delta Oscillys is an improvement above current destemmer technology with improved efficiency and qualitative destemming. The Delta Oscillys destemmer maintains the integrity of grapes and stems at higher throughputs, avoiding both rupture and shear. Destemming occurs with a subtle combination of oscillation, inertia, and gravity, up to 12 tons/hour on hand-picked fruit.

The Bucher, Delta, and Costral lines of equipment provide wineries high-quality long-term equipment with exceptional dependability, and a local parts and service department.

For further information, contact:
Bucher Vaslin North America.
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tel: 707/823-2883; fax: 707/823-6954
email: sales.northamerica@buchervaslin.com
website: www.bvnorthamerica.com

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EURO-MACHINES, INC.

In today's economic times, the Europress is a wise long-term investment for any winery, large or small. Its consistently high trade-in value is an added bonus when you are ready to upgrade to a larger press. Manufactured in Germany, under the highest standards, the Europress is a "workhorse" that serves to make the best wines – the best for the best!

Other quality winery equipment offered by Euro-Machines:

- All-stainless steel tanks (open top, multi-chamber, and storage), available from 25 to 25,000 gallons.

- Conveyor belts, with the following standard features:
  - » Open construction for easy cleaning;
  - » All stainless steel;
  - » Variable frequency drive for gentle motion, with motor mounted on top for better leverage;
  - » Conclave belt cleats;
  - » Customization available for specific winery needs.
- Sorting tables with customization available.
- Destemmer-crushers, ranging from 3 to 40 tons per hour.
- Pumps.
- Mixers.

Euro-Machines, the U.S. subsidiary of Scharfenberger Company of Germany, is committed to excellent customer service. Factory-trained technicians are always happy and available to assist if needed.

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WEST: 497 Edison Ct, Suite G, Fairfield, CA 94534
tel: 707/864-5800; fax: 707/864-5879
EAST: PO Box 843, Culpeper, VA 22701
tel: 540/825-5700; fax: 540/825-5789
e-mail: karen@euromachinesusa.com
website: www.euromachinesusa.com

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CUSTOM METALCRAFT

CUSTOM METALCRAFT has provided quality tanks and equipment to the wine industry for almost 20 years. A family company that understands the challenges presented in the winemaking process, Custom Metalcraft can make the best recommendation for winery product needs.

Custom Metalcraft offers TranStore® wine storage and fermentation tanks in a variety of standard or custom sizes, up to 3,000 gallons. Tanks may be used for storage, fermentation, or cold stabilization. Numerous options include jackets, sample valves, thermowells, side manways, and special interior finishes. Tanks can be stacked 3-high, and moved with a fork truck or pallet jack. Custom Metalcraft can custom fabricate according to winery specifications.

Custom Metalcraft has added 60 gallon stainless barrels to its product line, made from 10 gauge 304 SS material, which can be stacked up to 6-high in all standard barrel racks.

Custom METALCRAFT® INC.

Custom Metalcraft offers bin dumpers, heat exchangers, incline conveyors, receiving hoppers, horizontal and incline augers, and sorting tables. All equipment can be customized to fit winery applications.

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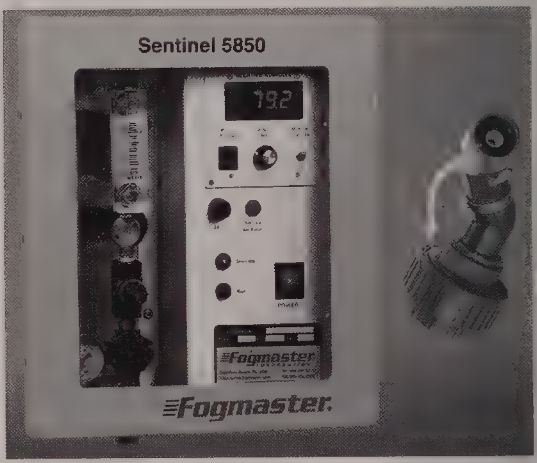
PO Box 10587, Springfield, MO 65808-0587
tel: 417/862-0707; fax 417/864-7575
e-mail: cmcsales@custom-metalcraft.com
website: www. custom-metalcraft.com

PLEASE SEE CUSTOM METALCRAFT AD, PAGE 26.

FOGMASTER CORPORATION

Fogmaster's Sentinel-5850 barrel-room humidification system brings innovative atomization technology to small- and mid-size wineries. It uses a turbulent-vortex nozzle to atomize water into micro-droplets that evaporate quickly and spread uniformly throughout the barrel room.



The control unit (see photo) monitors relative humidity and regulates water flow. A regenerative blower, designed for efficiency and low-maintenance cost, provides air to atomize water.

When humidity drops below the set point, the control unit activates the system and the nozzle ejects a fog of tiny droplets. The droplets evaporate quickly and raise humidity so barrels stay dry. Because the nozzle has no tiny orifices, nozzle plugging is not an issue.

Designed for "do-it-yourself" installation, the Sentinel-5850 includes all installation components except two-inch PVC pipe from the blower to the nozzle.

A single nozzle system can maintain humidity in barrel rooms of 1,000 to 5,000 square feet. A cart option is available for users who want to move the humidification system from room to room.

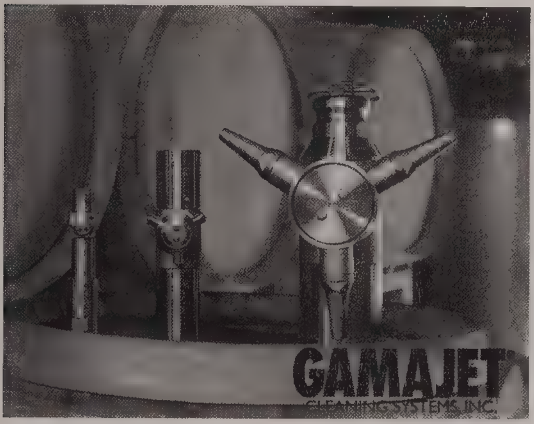
For more information, contact:
Fogmaster Corporation
1051 SW 30th Ave., Deerfield Beach, FL 33442
tel: 954/481-9975; fax: 954/480-8563
e-mail: info@fogmaster.com
website: www.fogmaster.com

PLEASE SEE FOGMASTER CORP. AD, PAGE 43.

GAMAJET CLEANING SYSTEMS

Gamajet tank cleaning machines offer fast and efficient cleaning of barrels, tanks, and totes. The fluid-driven machines scour the entire interior in a 360-degree pattern, which eliminate cross-contamination, microbial growth, and stubborn tartrates.

Barrel cleaning machines: Leaving the barrels in the preferred position, stacked or racked, the fluid-driven machines, connected to a standard pressure washer, enter through the bunghole. In under four minutes, the machine will have indexed in a 360-degree pattern, scouring all parts of the barrel. Designed to produce at least 5 pounds of force on the barrel interior, the machine easily removes tartrates without harming barrels. At a rate of only 4 gallons per minute to clean a barrel, less than 12 gallons of water are needed.



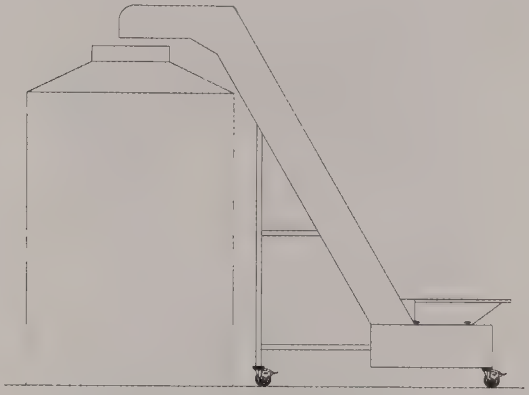
Tank cleaning machines: For cleaning tanks up to 75 feet in height, the Gamajet E-Z8 will work with most transfer pumps to create a closed-loop tank cleaning system. Entering through the manway on a cart, or from above on a hose or lance, the Gamajet machine will scour the entire tank interior, removing stubborn stains and tartrates. With a Gamajet, winery personnel can clean a tank in under 30 minutes, without climbing into the tanks to scrub and power-wash them.

For more information, contact:
Gamajet Cleaning Systems, Inc.
604 Jeffers Circle, Exton, PA 19341
Toll-Free: 1/877-Gamajet
tel: 610/408-9940; fax: 610/408-9945
e-mail: sales@gamajet.com
Website: www.gamajet.com

PLEASE SEE GAMAJET AD, PAGE 40.

P&L SPECIALTIES

New from P&L Specialties is the "Z" tank feed conveyor. This conveyor is specially designed to deliver destemmed berries from sorting equipment to tank tops. The conveyor is designed to require a minimum of horizontal floor space. Other designs require a minimum of 1 foot of floor space for every 1 foot of tank elevation. The new "Z" tank feed conveyor reduces that by 50%.



P&L Specialties expands the patented Le Trieur™ (LT) line of MOG separation machines, now available in capacity from 5 tons to 60 tons per hour throughput. The patent includes the LT's special separation screen technology and gentle oscillating action, making the LT a great choice for wineries processing different red varieties, and seeking precise separation results.

The RAKE™ is a low-cost, no-labor, air knife technology designed to be used between the LT™ and a post-destemmer sorting table. The RAKE™ is described as "a lot of extra hands" removing vegetative pieces before final inspection on a post-destemmer sorting table.

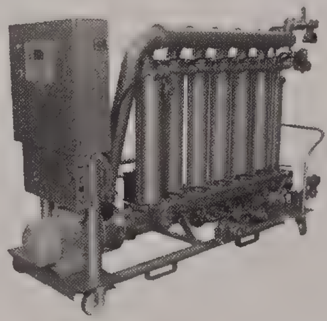
The Consista-Flow™ 5 ton-per-hour whole cluster destemmer feed conveyor is designed to eliminate smashed grapes, stemmed clusters, excessive jacks and stem pieces caused by overloading and uneven feeding of the destemmer. The rubber-modified vinyl belt and easy-to-sanitize design enhance the Consista-Flow's performance.

For more information, contact:
P&L Specialties
1650 Almar Pkwy, Santa Rosa, CA 95403
tel: 707/573-3141; fax: 707/573-3140
e-mail: sales@pnlspecialties.com
website: www.pnlspecialties.com

PLEASE SEE P&L SPECIALTIES AD, PAGE 49.

GUSMER ENTERPRISES

Gusmer Enterprises represents Bucher Vaslin Flavy FX cross-flow filters to the U.S. wine industry. The product line offers an appropriate size cross-flow filter for every winery and budget. Bucher Vaslin's Flavy FX1, FX2, and FX3 filters for small wineries offer flow rates of 150 to 1,000 gallons/hour. For mid-size wineries, the FX5 and FX6 models range from 745 to 2,000 gallons/hour. For large winery use, the FX100 and FX400 Bucher filters handle flow rates of 1,500 to 15,000 gallons/hour.



The Bucher Vaslin Flavy FX cross-flow filter's design utilizes a low filtration differential pressure (maximum 1.2 bar) and operates with essentially no increase in wine temperature. An automatic back-flush system maintains an optimum flow rate. This system eliminates the handling concerns and need for disposal of loose filtration media. The units are fully automated and can operate around the clock without direct operator supervision.

Evaluate a Bucher Vaslin filter at any facility with a demonstration unit. Full-time cross-flow technical staff is available for demonstrations, training, and service calls. Contact a Gusmer Enterprises representative for more details.

Gusmer Enterprises, Inc.®

For more information contact:
Gusmer Enterprises
Kathy Bollack, Dave Gusmer, Bill Merz, Tim Ossun, Rodger Pachelbel, Lauren Sloan, Ken Stewart
81 M Street, Fresno CA 93721
tel: 559/485-2692; fax: 559/485-4254
e-mail: sales@gusmerenterprises.com
website: www.gusmerenterprises.com

PLEASE SEE GUSMER ENTERPRISES AD, PAGE 15.

SNYDER INDUSTRIES

Snyder Industries introduces 2-barrel and 4-barrel Rack-Master® to its Wine Master Product collection.

Rack-Master® provides a cost effective 100% polyethylene barrel racking solution with an unlimited useful life, eliminating the routine maintenance and refurbishing expenses associated with corrosion in metal barrel racking systems. Rack-Master® is sanitary, lightweight, and sturdy with aesthetic appearance. Rack-Master® maximizes barrel oxygen exposure by limiting barrel contact points, and Rack-Master® polyethylene is 100% recyclable.

Snyder offers poly "Bulk Barrel," a proprietary design virtually permeable to water and alcohol vapor, which eliminates leaking and routine topping, while allowing valuable oxygen molecules to permeate the vessel's sidewall. Bulk Barrel is available in 4-barrel (240 gallon), 5-barrel (300 gallon), and 6 barrel (360 gallon) capacities.

Snyder's "Winetainer" includes a dimple heat transfer surface to facilitate targeted cooling objectives. Available in sizes from 120 to 790 gallons, with optional open-top style, and standard top fill or several manway door options.

For more information, contact:
Snyder Industries, Inc.
Jason Lenhoff, Product Manager
PO Box 4583, Lincoln, NE
tel: 402/467-5221; fax: 402/465-1220
e-mail: sales@snydernet.com
website: www.snydernet.com

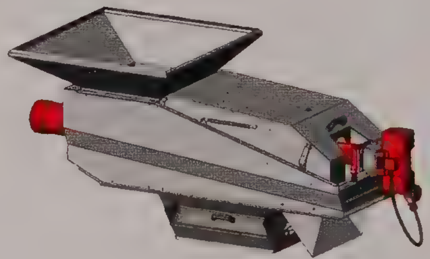
PLEASE SEE SNYDER INDUSTRIES AD, PAGE 5.

SCOTT LABORATORIES, INC.

The WILLMES Sigma pneumatic press has innovative FlexiDrain juice elements made from a robust new material with more open area for juice flow, which cleans easily. Customers report improved juice yields, shorter pressing cycles, low solids, obtaining up to 93% of the total white juice yield with less than 0.5 bar inflation. A door-venting valve can further reduce the press cycle times.

Other features include:

- Patented "Flexi-Drain" vertical juice channels;
- Press can be hermetically sealed allowing for must treatment options such as maceration, micro-oxygenation, or inert gas pressing;
- Inflation of the membrane in the filling position – optimal initial dejuicing is achieved without any rotation of the drum;
- Fully automatic, fully programmable electronic controls;
- Can be used to press small quantities.



The original Armbruster Rotovib 10 (maximum 10 tons/hr) has now spawned the Rovib 20, 30, and 40 with increased capacities. Pinot Noir producers, in particular, can now control skin phenolics much better with gentler destemming, minimizing grape damage. Destemming cylinders with different size holes are available.

For more information, contact:
Scott Laboratories, Inc.
2220 Pine View Way, Petaluma, CA 94954
tel: 707/765-6666; fax: 707/765-6674
e-mail: info@scottlab.com
website: www.scottlab.com

PLEASE SEE SCOTT LABS ADS, PAGES 21, 34.

SPEC TRELLISING

The VaporONE electric-powered steam system will clean and sanitize bottling lines, filter systems, filling machines, and barrels, and disinfect stainless steel tanks. Steam penetrates the micro-filters and pores of piping surfaces for complete sanitizing.

VaporONE features automatic shut-off and refill, thermostat and pressure controls, safety pressure valve, polymer rubber steam hose, low-voltage (24V) controls, and various power options in 200V and 440V models. VaporONE is simple to use, without cumbersome knobs, levers, or controls, and heats to working temperature in a few minutes. Unit cleans with a simple rinse; steam lance and diffuser optional.

Cella-Stac is a palletized, modular system for safely storing bottled wine, comprised of layers of thermo-formed, food-grade plastic sheets. Cella-Stac 48CS accommodates 48 bottles per layer, and Cella-Stac 40CS accommodates 40 bottles per layer. Both sizes work with most bottle types.

Because of the individual bottle cavities, there is no bottle-to-bottle contact, so breakage is less than with traditional bottle storage techniques, with good airflow between bottles. As each tray is filled, a new layer is placed on top, until the pallet is complete.

Cella-Stac CS48 can safely contain up to 14 layers (672 bottles) and stack up to three pallets (2,016 bottles) high. Cella-Stac CS40 can safely contain up to 14 layers of 40 bottles (560 bottles). Cella-Stac has a life expectancy of up to 15 years.

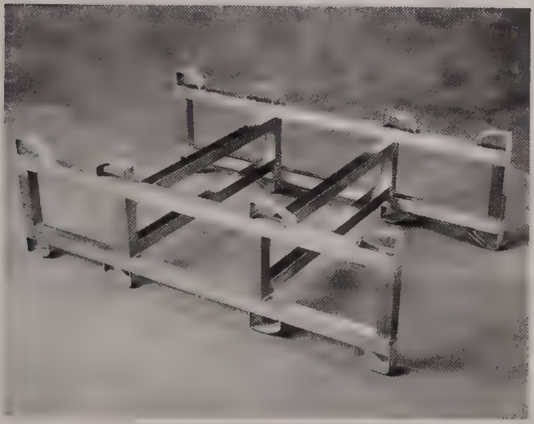
For more information, contact:
Spec Trellising
39 Indian Drive, Ivyland, PA 18974
tel: 800/237-4594; 215/322-5588
fax: 215/357-3122
e-mail: info@spectrellising.com
website: www.spectrellising.com

PLEASE SEE SPEC TRELLISING AD, PAGE 32.

G.W. KENT, INC.

G.W. Kent has supplied wineries, breweries, and beverage industries since 1985. The company has a catalog and an online store with a full line of winery equipment and supply needs, including:

- destemming, crushing, and sorting equipment;
- refractometers and other testing instruments;
- bins;
- presses;
- tanks;
- valves;
- fittings;
- filters;
- pumps;
- gauges;
- corkers and fillers;
- corks;
- capsuling and labeling machines and more!



G.W. Kent stainless steel barrel racks have replaced many rusty metal barrel racks in wineries all over the U.S. In addition to offering racks that outshine the competition, G.W. Kent offers competitive prices and quick delivery from stock, or custom production. By reducing winery labor and maintenance costs, stainless steel racks are an investment that pays for itself in less than three years.

Shop for racks and much more. Order a catalog, or shop online at gwkent.com.

For more information, contact:
G.W. Kent, Inc.
506 S. Huron, Yesilanti, MI 48197
tel: 800/333-4288, or 734/572-1300
e-mail: info@gwkent.com
website: www.gwkent.com

PLEASE SEE G.W. KENT AD, PAGE 27.

OGLETREE'S, INC.

For 65 years, Ogletree's has specialized in custom fabrication of winemaking equipment. By relying on the continual pursuit of innovation and the company's historical stability, Ogletree's is able to optimize value and quality to satisfy the wine industry's needs, while providing customers with the security that the job will be done right the first time.

Ogletree's manufactures high-quality hoists, receiving hoppers, belt and screw conveyors, sorting systems, bin dumpers, transfer lines, catwalk systems, and more. Ogletree's provides maintenance on all equipment offered.

Ogletree's has added two new bin dumpers to the product line. One uses a 110-volt linear actuator to dump, eliminating expensive, bulky hydraulic systems. It also features a gate to provide superior metering by holding grapes, releasing them in small amounts. Another bin dumper can be loaded by pallet jack or forklift, and is designed for direct-to-press feeding. It also can be upgraded to feed both doors of a two-door press.

Ogletree's years of service to the wine industry serves as a foundation to its design team, who design a superior product by collecting input from clients and focusing on specific needs. By utilizing solid quality-control procedures and a precise six-point inspection, Ogletree's team of experienced fabricators deliver products second-to-none.

For more information, contact:
Ogletree's, Inc.
935 Vintage Ave., St. Helena, CA 94574
tel: 707/963-3537; fax: 707/963-8217
e-mail: samp@ogletreecorp.com
website: www.ogletreecorp.com

PLEASE SEE OGLETREE'S AD, PAGE 42.

VACUUM BARRIER CORPORATION

Vacuum Barrier's line of Nitrodose liquid nitrogen injection systems provide a drop of rapidly-expanding liquid nitrogen, allowing winemakers to keep the dissolved oxygen level to a minimum. Whether the winery practices pre-fill inerting or headspace conditioning, oxygen levels are greatly reduced to provide a longer shelf life for wines.

The extreme precision allows packages to receive the correct dose at any line speed. High-efficiency vacuum insulation dramatically reduces liquid nitrogen consumption. The clean, hygienic design and hands-free CIP protection is ideal for high-pressure water, or chemical clean-up in sensitive filling areas.

Vacuum Barrier's Nitrodose Easy Dose System offers:

- Low-cost liquid nitrogen injection for all package types;
- Simple installation, operation, and start up to pressurize or inert a variety of packages;
- Sealed and dynamic systems available;
- PLC controlled with selectable language;
- No container/no dose capability;
- 3-D (directional dose dispersion) technology for special applications.

Additional options are available to best serve winery special requirements.

For more information, contact:
Vacuum Barrier Corporation
Edward Hanlon, VP Worldwide Sales
4 Barten Ln., Woburn, MA 01801
tel: 781/933-3570; fax: 781/932-9428
e-mail: sales@vacuumbarrier.com
website: www.vacuumbarrier.com

ADI Systems Inc.

ADI Systems Inc. specializes in industrial wastewater treatment and offers many solutions for wineries, from treatment to water reuse. ADI has installed numerous systems worldwide including clients such as Anheuser-Busch, MillerCoors, Guinness, and Baileys.

ADI-MBR (Membrane Bioreactor) — A membrane bioreactor (MBR) system, based on the world's leading flat-plate MBR technology, can produce reuse-quality water within an easy-to-operate, small-footprint package. Effluent from the ADI-MBR will meet the strictest discharge limits and offer wineries a variety of disposal options including irrigation, aquifer recharge, or direct discharge. The technology is used in several wineries worldwide.

Anaerobic Technologies — For large wineries, ADI offers anaerobic systems that are ideally suited to treating high-strength wastewater generated at wineries and provide an efficient, economical solution to wastewater problems. Wineries can utilize the biogas generated in these systems to displace electricity or natural gas use in the winery, providing an additional economic benefit.

Contact ADI today and explore solutions to handle your winery's wastewater treatment needs and improve the overall bottom line. Ask about our superior ADI-AnMBR technology.

For more information, contact:
ADI Systems Inc.
Al Cocci, Vice President
PO Box 397, 7 Pointe Sewall Rd, Wolfeboro, NH 03894
tel: 800/561-2831 (US and Canada) or 603/569-0955; fax: 603/569-0957
e-mail: systems@adi.ca
website: www.adisystemsinc.com

PLEASE SEE ADI SYSTEMS AD, PAGE 10.

St. Patrick's Of Texas

St. Patrick's supplies equipment for small to mid-size wineries from three warehouses (35,000 square feet) in Austin, TX. Product descriptions and pricing are available online at www.stpats.com. Equipment manuals are also available online.

St.Patrick's of Texas

St. Patrick's of Texas stocks the following equipment:

- Revello peristaltic pumps,
- NIKO pneumatic membrane presses,
- MEP semi-automatic corkers,
- MEP semi-automatic labelers,
- Letina wine tanks,
- EnoItalia crusher/destemmers,
- Sanitary valves and fittings,
- Filling machines,
- Plate and frame filters,
- Membrane filters,
- Wine and must pumps,
- Heat-shrink and foil applicators.

For more information, contact:
St. Patrick's of Texas
1828 Fleischer Dr., Austin, TX 78728
tel: 512/989-9727; fax: 512/989-8982
e-mail: stpats@stpats.com
website: www.stpats.com

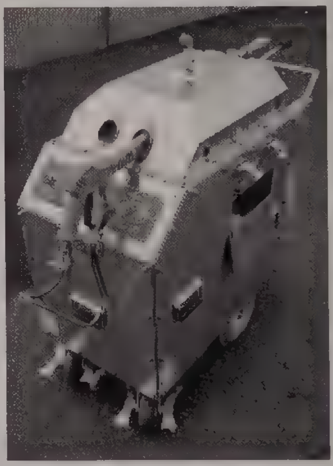
PLEASE SEE ST. PATRICK'S AD, PAGE 47.

ARS/Pressure Washer Company

The ARS SWASH™ steam generators have proven to be a very effective method of cleaning and maintaining barrels in the industry. In addition to knocking down or eliminating Brett, the ARS proprietary design and methodology has been documented to remove residual wine from the pores of the wood, permitting new wine to capture remaining flavors from the oak.

SWASH™ accessories include a single or dual channel automatic timer for safe, overnight sterilization of a bottle filler and/or filter assembly; the SWASH™ pipe cleaning and sanitization system includes a pipe pigging device for pipeline product recovery and cleaning, and a simple attachment that facilitates sterilization of hard piping in the facility.

ARS offers customized Miele NSF-approved dishwashers for sanitizing tasting room stemware. Special stainless steel baskets can securely hold 16 to 20 large Bordeaux wine glasses.



Also available: SWASH™ industrial pressure washers for general purpose cleaning, Moog barrel washers, Bitard barrel rinsers, Fogmaster barrel room humidifiers, and other products for winery cleaning, sanitization, and sterilization needs.

The ARS showroom is open by appointment. Call for demonstrations.

For more information contact:
ARS/Pressure Washer Company
1184 Maple Lane, Calistoga, CA 94515
tel: 707/942-8330; fax: 707/942-8337
e-mail: info@arsenterprises.com
website: www.cleanwinery.com

PLEASE SEE ARS ENTERPRISES AD, PAGE 51.

SANITARY STAINLESS WELDING, INC

Sanitary Stainless Welding, Inc. manufactures custom fabricated storage and fermentation tanks for the wine industry. Tank size rangse from 250 gallons to 700,000 gallons.

Options include, but are not limited to:

- dimple jackets;
- channeled jackets;
- manways of various sizes;
- sample and racking ports;
- a variety of fittings and valves.

Tanks are offered with sloped or conical bottoms to sit on either metal or concrete bases. Tank tops include off-center, truncated or centered, conical tops.

Sanitary Stainless Welding, Inc. offers custom-design catwalks in either stainless steel or aluminum. The company also offers "tube in tube" heat exchangers, grape receiving hoppers, screw conveyors, tubing line installation, crusher repairs, press repairs, tank modification, and repairs.

Sanitary Stainless Welding, Inc. was founded in the original Valley Foundry facility in 2004, to be a premier tank construction solution.

For more information, contact:
Sanitary Stainless Welding, Inc.
2550 S. East Ave., Suite 101-B, Fresno, CA 93706
tel: 559/233-7116; fax: 559/233-7172
e-mail: jimm@sanitarystainless.com

PLEASE SEE SANITARY STAINLESS AD, PAGE 84.

PRO REFRIGERATION INC.

Pro Refrigeration is a leading manufacturer and supplier of refrigeration equipment to the wine industry. Pro's mission is to build the highest quality, most efficient chiller systems for the markets they serve. Pro strives to not only provide a turnkey solution for the larger production wineries, but also be the best solution for wineries of all sizes.

ChilStar
CHILLER • SYSTEMS

Pro Refrigeration offers a new line of compact systems: The ChilStar™ Micro Chiller System is available in 2 HP, 3 HP, and 5 HP models. These systems can control up to five fermentation tanks of varying sizes and have the ability to operate at a 20°F chilled glycol temperature for cold settling and cold stabilizing duties. Pro Refrigeration offers this line as a solution for wineries working with limited production, and an affordable option that a large producer can utilize for individual tank control.

Pro is fortunate to have collaborated with some of the finest winemakers to develop and expand a product line specifically for the winemaking craft.

For more information, contact:
Pro Refrigeration Inc.
326 8th St. SW, Auburn, WA 98001
tel: 253/735-9466; toll-free: 800/845-7781
fax: 253/735-2631
e-mail: info@prorefrigeration.com
website: www.prochiller.com

PLEASE SEE PRO REFRIGERATION AD, PAGE 63.

COLLOPACK SOLUTIONS

ColloPack Solutions is a leading provider of bottling equipment and grape processing systems. ColloPack's premium line of bottling equipment, from single machines to complete integrated lines, includes the Bertolaso cleaner/filler/corker/capper bloc, Robino & Galandrino capsuling equipment, Cavagnino & Gatti PS and wet glue labelers, Francesca pumps (photo), CIVision inspection systems, and Bertolaso automated conveying systems.

ColloPack provides engineering, project management, installation of equipment, and comprehensive after-sales service, including a large inventory of replacement parts, equipment repair, training and maintenance programs customized to each winery's needs.

Diemme, a leading manufacturer of grape presses and grape conveyors, is also represented by ColloPack. Diemme's product line includes Kappa destemmer/crushers (8 to 150 tons per hr.); Kappa grape sorting and conveying systems, including belt and vibrating conveyors and belt elevators; Membrane presses (1,500 to 75,000 liter capacity); Vintage basket presses (500 to 2,300 liter capacity); and Enotork continuous presses (620 to 1,200 mm diameter).

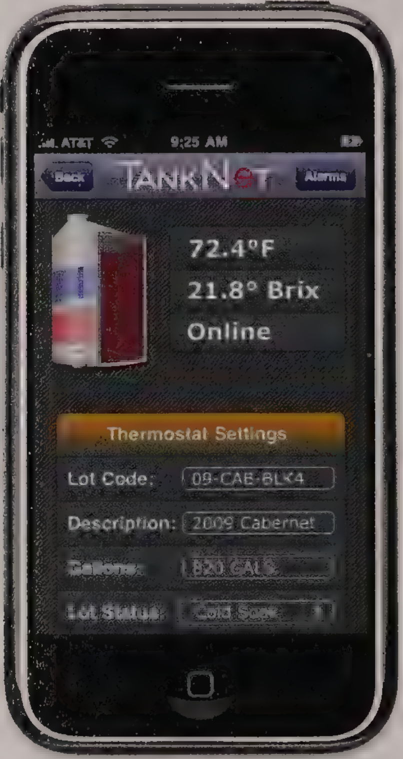
For more information please contact:
ColloPack Solutions
Dave Means, Phil Giacalone,Rick White, Joe Mironicki, Tom Kennedy (Northwest), Scott Irwin (Central Coast), Craig Richardson, or Greg Fulford
193 Camino Dorado, Napa, CA 94558
tel: 707/258-3940; fax: 707/258-3949
e-mail: sales@collopack.com
website: www.collopack.com

PLEASE SEE COLLOPACK SOLUTIONS AD, PAGE 25.

ACROLON TECHNOLOGIES, INC.

For more than a decade, Acrolon's TankNET® system has helped hundreds of wineries better manage their fermentations, precisely control cellar environments, and conserve energy.

Only TankNET® provides hands-on control from anywhere while seamlessly integrating production software to deliver a comprehensive view of the entire winemaking process. TankNET® controls are easy-to-use, work stand-alone, and require NO NEW WIRES at the tank for networking.



72.4°F
21.8° Brix
Online

Lot Code: 09-CAB-BLK4
Description: 2009 Cabernet
Gallons: 820 GALS
Lot Status: Cold Soak

Main features include calibration-free temperature control, web access to real-time fermentation data, dynamically updated "white-board" tank charts, multi-stage chiller control, flexible e-mail alarms, and more.

Options include an energy-savings module, smart scheduler, automated pump-overs, continuous Brix measurement, level detection, humidity/CO2 control, and integration with production software systems such as VinX2, WMDB, Blend, and others.

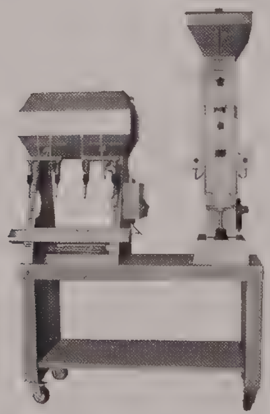
For more information, contact:
Acrolon Technologies, Inc.
19201 Sonoma Hwy, Sonoma, CA 95476
tel: 707/938-1300; fax: 707/938-1342
e-mail: info@acrolon.com
website: www.acrolon.com

PLEASE SEE ACROLON TECHNOLOGIES AD, PAGE 36.

NAPA FERMENTATION SUPPLIES

Napa Fermentation Supplies offers a full line of winemaking equipment and supplies, including variable capacity stainless steel tanks with adjustable lids from 26 gallons to 2,693 gallons and closed-top tanks from 79 gallons to 5,221 gallons, with or without manway, and with or without cooling jackets.

Also available are: Karcher hot water pressure washers with 1,300 psi to 3,000 psi and temperatures from 86°F to 285°F steam; one-inch and 1.5-inch Jabsco pumps with AC inverter drive; two-inch or three-inch Zambelli must pumps with AC inverter drive; Zambelli crusher/destemmers from two to 14 tons per hour; Zambelli manual and hydraulic, membrane, and bladder presses; eight-inch and 16-inch Zambelli plate filters; a full line of stainless steel fittings and valves, butterfly and ball; one-inch to four-inch wine hose; labware; refractometers; wine thieves; and table-top labelers.



Tivoli corking/filling machine, made of AISI-304 stainless steel, has four jaws for use with synthetic or natural corks with 22, 24, or 26mm diameter. The corking pin has a pneumatic piston, inserting rapidly to create less pressure on bottleneck, and the cork hopper has mechanical agitator for continuous cork feed. The four-spout filler has high/low fill sensors, comes with or without vacuum, 110 VAC, and will fill 500 to 600 bottles/hour.

For more information, contact:
Napa Fermentation Supplies
575 Third St., Bldg. A, Napa, CA 94559
tel: 707/255-6372; fax: 707/255-6462
website: www.napafermentation.com

PLEASE SEE NAPA FERMENTATION AD, PAGE 31.

RAYNOX 2000, INC.

Recent modernization of the manufacturing plant allows Raynox to offer the best quality ever with refined design. Raynox off-the-line standard tank models set an industry benchmark for red and white fermentation and storage tanks.

From well-designed standard models, to carefully crafted custom tanks and on-site fabrication, Raynox has assisted North American wineries of all sizes, ensuring quality and craftsmanship meeting high standards. Custom fabrication expertise ensures Raynox can meet winemakers' exact needs.

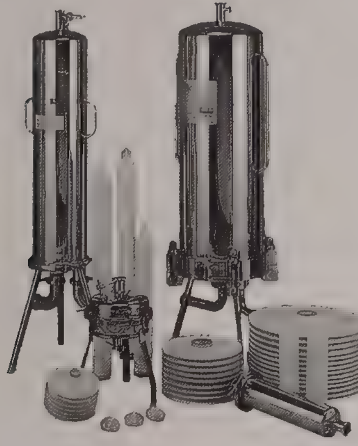
Raynox repeat customers especially value the post-sales service.

Raynox offers winemaking equipment selected with the same care used to manufacture tanks. From the sorting table to bottle labelling, Raynox has equipment to help winemakers every step of the way.

For more information, contact:
Raynox 2000 Inc.
Sales Department
1148 St. Michel Street, St-Césaire
Quebec, Canada J0L 1T0
tel: 866/469-4181 (toll free); fax: 450/469-2112
e-mail: info@raynoxinc.com
website: www.raynoxinc.com

3M PURIFICATION

3M Purification (formerly CUNO) is a world leader in the design and manufacturing of a comprehensive line of filtration products and systems for the clarification and final filtration of fine wines.



Innovative 3M Purification products for wine filtration include the first dual-zone clarification depth filter cartridge (Zeta Plus™ MH Series), the first integral multi-zoned membrane prefilter (LifeASSURE™ BLA series), and the first nylon-based final membrane filter optimized for repetitive hot water exposure (LifeASSURE BA series).

3M Purification also offers the LifeASSURE BNA series of final membrane filters. These final filters combine three innovative technologies from 3M to significantly improve filter throughput and reduce operating costs. A highly asymmetric microporous membrane, a specialized pleating design, and a novel support layer construction, deliver ultra-fast flow rates, secure spoilage organism retention, and remarkable throughput.

With close to 100 years of experience and manufacturing facilities on five continents, 3M Purification is uniquely suited to provide solutions to wineries worldwide.

For more information, contact:
3M Purification Inc.
400 Research Pkwy, Meriden, CT 06450
tel: 800/243-6894; fax 203/630-4530
e-mail: cjohara@mmm.com
website: www.cuno.com

PLEASE SEE 3M PURIFICATION AD, PAGE 20.

RLS EQUIPMENT CO., INC.

RLS Equipment Company has provided wineries with quality equipment and service for more than 40 years. As agent for Kiesel, Amos, Strassburger, and Magitec, RLS can supply complete crushing and pressing systems.

Kiesel progressive-cavity pumps are available in hopper and in-line styles from 1,000 liters to 200+ tons per hour (tph). Unique Kiesel "corrugated" tube-in-tube heat exchangers can process from hundreds to thousands of gallons per hour, and save $$$ in energy costs.

Strassburger's MCC Crossflow Filtration system is a completely PLC-controlled unit that allows highly flexible control, and yields one of the lowest recirculation rates (less pumping of wine). Strassburger offers high-quality plate/frame and lees filters (S/S construction with either S/S or noryl plates are durable and easy to clean). A wide variety of filter pads is available.

The Magitec A-5 destemmer/crusher is designed for hand-sort/low volume. Magitec's unique square-hole basket is available from 2.5 tph to 60+ tph capacity. Magitec offers a variable-speed, dual-drive system (basket/beater bar) on small units, and split machines with vibrator sorting tables between destemming and crushing.

RLS offers a complete line of receiving and sorting equipment, and can easily supply a complete crushing system or "turn-key" winery.

RLS offers domestically-produced OEM-material, replacement membranes for most presses, and an extensive used equipment listing featuring completely reconditioned presses.

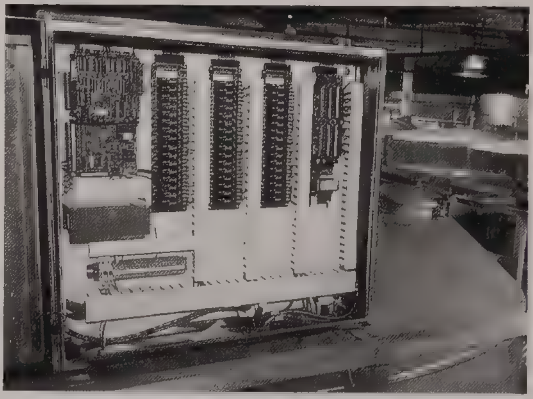
For more information, contact:
RLS Equipment Co., Inc.
1017 White Horse Pike, Egg Harbor, NJ 08215
tel: 609/965-0074,
or West Coast tel: 800/527-0197
fax: 609/965-2509
e-mail: rls.equip@att.net
website: www.rlsequipment.com

PLEASE SEE RLS EQUIPMENT AD, PAGE 54.

LOGIX

Logix Winery Control Systems (WCS) provide energy-efficient operation of refrigeration related equipment with documented savings in excess of 40%. The Logix WCS monitor and manage loads to minimize energy use, coordinating the demand and supply side of a winery's refrigeration system to provide cooling at the lowest possible energy consumption.

The Logix WCS is specifically designed for the demands of winery control applications, providing integration and control of wine tanks, compressors, chillers, air units, CO_2 monitoring/fresh air exchange, wastewater management, and more. Modular design offers easy expansion to accept additional equipment as a facility grows.



The Logix TC-2000 electronic thermostat with NEMA-4X waterproof enclosure provides stand-alone single- or two-stage cooling/heating control for wine tanks. The TC-2000s can be networked for integration with Logix Winery Control systems. All operating data and alarms are logged and available for plotting and reporting.

Logix has more than 20 years of control system design and installation experience. Current wine installations include Turner Road Vintners, Chateau Ste. Michelle, Opus One, Columbia Crest, Franzia, Hogue Cellars, Novelty Hill - Januik, Woodbridge Winery, Silverado Vineyards, St. Francis, Swiftwater Cellars, and Starmont.

For more information, contact:
Logix
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tel: 425/828-4149; fax: 425/828-9682
e-mail: contact@logix-controls.com
website: www.logix-controls.com

PLEASE SEE LOGIX CONTROLS AD, PAGE 22.

Wine in America
LAW AND POLICY

This excerpt from Wendell Lee's chapter focuses on wine advertising. Lee is General Counsel to the Wine Institute.

Chapter 3: Advertising

Labeling practices and advertising practices on the federal label do not substantially differ. What is prohibited on a label is prohibited in advertising. In many cases, a winery could use a label approved by the TTB to "clear" advertising statements that it wishes to use in the marketplace.

There are, however, major differences in the advertising practices across product categories. Malt beverage and spirits producers generally spend much more money advertising than wineries.

Here is a simple test: Try to remember your favorite television commercial for beer. Did it make you laugh? Now, do the same for wine. Did any brand come to mind? Television is not the medium of choice for wine products because of cost and effectiveness.

Wine advertising is generally confined to print, radio, and new or social media outlets. But when the public looks at alcoholic beverage advertising, it does not make distinctions between wine, beer, and spirits advertising. Every industry segment is painted with the same brush.

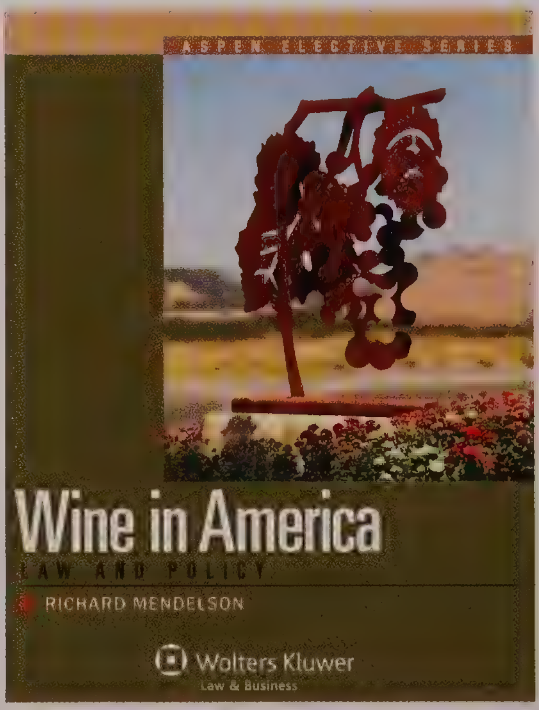
Wine advertising is limited in great part not by medium but by content. State and federal trade practice laws often frustrate a winery's advertising plans, regardless of the medium chosen. For example, in California a strict interpretation of Business and Professions Code §25600 prohibits wineries from engaging in contests within the state.

Content is also regulated in large part by industry advertising codes. In 1978, Wine Institute was the first trade association to publish a formal Code of Advertising Standards (the "Code"). Before that time industry codes were informal and overly general, although the wine, beer, and spirits sectors had each adopted general advertising practices and codes beginning in the1940s.

Before the launch of Wine Institute's Code of Advertising Standards in 1978, the Federal Trade Commission ("FTC") had to determine whether a trade association like Wine Institute could require adherence to the Code provisions by its members. The FTC's opinion required that Code compliance remain voluntary, but since then the FTC has retreated somewhat from that position.

Today, Wine Institute requires compliance with the Code by all its members as a condition of membership, and although the consequences of noncompliance hardly constitute punishment (violations are published on the Wine Institute website), as we discuss later, that is more than adequate.

Since 1978 both the Beer Institute and the Distilled Spirits Council of the United States (DISCUS) have launched their own self-regulation programs, surpassing in many ways



Richard Mendelson, long-time wine industry attorney with the law firm of Dickenson, Peatman & Fogarty (Napa, CA), who runs the Program on Wine Law and Policy at the University of California, Berkeley Law School, has authored and edited *Wine in America: Law and Policy* (Wolters Kluwer 2011). The book covers a wide range of topics that are integral to understanding the wine business, written by industry experts.

The authors and subjects include Jim Seff and Carrie Bonnington on trade practices, Wendell Lee on labeling and advertising, Jim Terry and Erik Lawrence on Business Models for Making Wine and Growing Grapes, Margot Mendelson on Twenty-First Amendment Jurisprudence, Richard Mendelson and Scott Gerien on Wine Brands and Appellations of Origin, Richard and Lynne Carmichael on Land Use: Rural Wineries and Urban Bars, Bill Casey and Andrew Wanger on Counterfeit Wines, Richard on Public Health and Social Responsibility, and Jacques Audier on International Institutions and Accords. Congressman Mike Thompson, who co-chairs the Congressional Wine Caucus, wrote the foreword.

"This book should be studied by any student, scholar, government regulator, or policymaker who wants to better understand the trade policy and legislative and regulatory aspects of wine," says Robert P. (Bobby) Koch, President and Chief Executive Officer of the Wine Institute.

Christopher Edley, Jr., dean of the U.C. Berkeley Law School, praised the book as a ground-breaking examination of one of America's most prominent success stories. "This is the first book of its kind in the U.S. covering the full range of important legal and related issues – past, present and future – of this multi-billion dollar industry. It is a rich blend of policy, law, business and more, brought to us by Richard Mendelson, an accomplished winemaker, distinguished legal practitioner, and inspiring law teacher."

the provisions of Wine Institute's Code. [Wine Institute's Code can be found at Code of Advertising Standards, Wine Institute, www.wineinstitute.org/initiatives/issuesandpolicy/adcode/details (last visited Jan. 21, 2011).]

Both organizations implemented third-party review of advertising before Wine Institute did, for example; this relates primarily to the differences in advertising pervasiveness and content among the various industry sectors.

Since 1999 the FTC has reviewed self-regulation in the alcohol industry. In response to a request from the Congressional Committees on Appropriations, the FTC examined the effectiveness of the alcohol industry's voluntary guidelines on advertising and marketing to underage audiences. The 1999 report [FTC, Self Regulation in the Alcohol Industry, A Review of Industry Efforts to Avoid Promoting Alcohol to Underage Consumers (1999), available at www.ftc.gov/reports/alcohol/alcoholreport.shtm 9last visited Jan. 21, 2011).] includes company-specific information supplied in response to orders by the Commission.

The FTC reviewed the industry again in September 2003 and in June 2008. In all these reviews, industry advertising guidelines and industry self-regulation were shown to reduce the likelihood that such marketing will, by its content or placement, target those under the legal drinking age: [FTC, Self-Regulation in the Alcohol Industry (2008), available at www.ftc.gov/os/2008/06/08062alcoholreport.pdf (Last visited Jan. 21, 2011).]

A well-constructed self-regulatory regime has advantages over government regulation. It conserves limited government resources and is more prompt and flexible than government regulation, given the substantial time required to complete an investigation or to adopt and enforce a regulation. Finally, self-regulation is an appropriate response to concerns about the impact of alcohol advertising on youth, in light of protections provided by the First Amendment to the U.S. Constitution. The Commission continues to believe, therefore, that alcohol industry self- regulation must play a prominent role in addressing concerns about alcohol marketing and youth. The Commission looks forward to the industry's adoption of its recommendations. [ID. at 25.]

The Center for Alcohol Marketing and Youth (www.camy.org) has been on the front line of advocacy for close federal monitoring of alcoholic beverage advertising. Its database of advertisements, including video, is thought-provoking, but the organization's bias for greater control is very clear.

Wine advertisements are rarely controversial. Wine Institute's third-party review procedure has never been used, and there is, on average, one complaint every two years. In every complaint to Wine Institute to date, the cited issues have been resolved quickly, effectively, and without incident. Here is one example:

Wine Institute's Advertising Code prohibits the use of Santa Claus [Code of Advertising Standards, supra note 272.]

3. Any advertisement which has particular appeal to persons below the legal drinking age is unacceptable, even if it also appeals to adults. Therefore, wine and wine cooler advertising by code subscribers shall not: . . .

b. Use music, language, gestures, cartoon characters, or depictions, images, figures, or objects that are popular predominantly with children or otherwise specifically associated with or directed toward those below the legal drinking age, including the use of Santa Claus or the Easter Bunny.

A few years ago, Wine Institute received a complaint from one of its members that another member was using a Santa Claus plush toy in its product displays in a national program. After one call to the member, the "Bad Santa" was removed from product displays in more than 20 states within two weeks.

Two complaints involved the labels of non-members. Following the movie release of Disney's "Ratatouille" in 2007, the company planned to sell a "Ratatouille" branded wine as part of its marketing plan. After a letter was sent to Disney explaining the Wine Institute Advertising Code, the plan to market the wine was scrapped.

Wine Institute, however, could not replicate that result with the "Hello Kitty" wine labels that are currently being imported from Italy. After licensing "Hello Kitty" images from Sanrio, an Italian wine producer launched a product line consisting of four labels utilizing four "Hello Kitty" images.[1] [See Maggie Rosen, "First Hello Kitty Wine on the Market," Decanter (June 4, 2009), www.decanter.com/news/wine-news/484739/first-hello-kitty-wine-on-the-market (last visited Jan. 21, 2011).]

After coming across a number of press accounts of the above products, Wine Institute located all of the label approvals in the TTB Public COLA Registry and sent a letter similar to the one that was sent to Disney to both the Italian producer and the New York importer. Wine Institute has not received a response, and the product, to best of its knowledge, is still being sold in various states.

But nothing illustrates the interconnection of the industry codes with government sanctions better than the "Wide Eye" schnapps and caffeine product. When Wine Institute was discussing the impact of industry advertising codes, many critics complained that the codes needed to go further in terms of punishment. In other words, self-regulation should also include harsh provisions for punishing an offender.

"Wide Eye" was marketed both on the Internet and in print advertising. [Constellation Brands, Inc.: Analysis of Proposed Consent Order to Aid Public Comment, 74 Fed. Reg. 31442, 31444 (July 1, 2009).] Because this was a distilled spirits–based product, DISCUS reviewed the product advertising following a competitor's complaint. [DISCUS, Semi-Annual Code Report: Code of Responsible Practices for Beverage Alcohol Advertising and Marketing 16 (Noc. 2008), available at www.discus.org/pdf/61367_DISCUS_WEB.pdf (Feb. 1, 2011).] The complaint alleged that the advertising for "Wide Eye" violated the DISCUS code provision that prohibits the promotion of the potency of an alcoholic beverage product. [Id.]

The DISCUS Code Review Board held that there was no violation regarding the "Wide Eye" brand name and that there was no violation of the Code for the tagline "This is your wake-up call." The tagline is shown in Figure 1. [Id.]

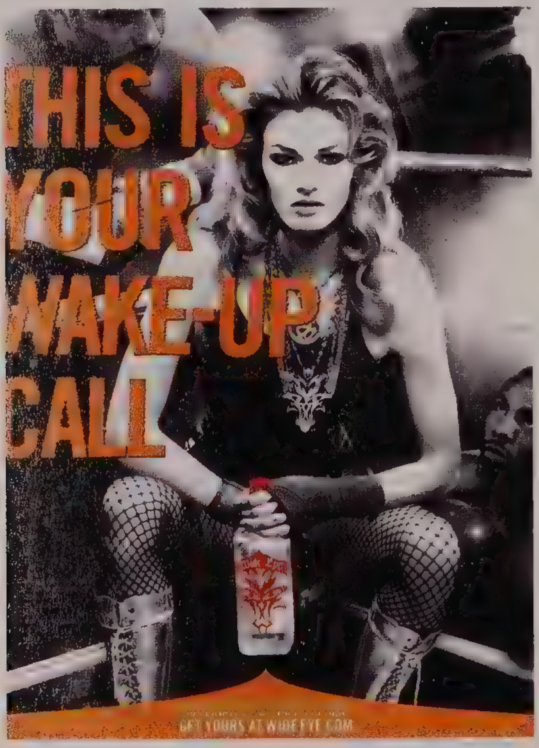


Figure 1: This is your wake up call

In the "Wide Eye" case, one consequence of failing to move fast enough following the finding of an Advertising Code violation was an action initiated by the FTC for making deceptive claims. The FTC decided to move ahead with its complaint despite the fact that the manufacturer of the product already had decided to discontinue it. [See In the Matter of Constellation Brands, Inc. A Corporation: FTC File No. 092 3035, FTC, www.ftc.gov.os/caselist/0923035/index.shtm (Last visited Jan. 21, 2011).]

Specifically, the FTC alleged that the manufacturer represented, expressly or implicitly, that consumers who drink "Wide Eye" will remain alert when consuming alcohol but had no reasonable basis to substantiate that representation when it was made. [Constellation Brands, Inc.; Analysis of Proposed Consent Order to Aid Public Comment, 74 Fed. Reg. at 31443.]

A consent decree to prevent the manufacturer from engaging in similar practices in the future was issued following a public comment period. [Id.] But "Wide Eye" serves another purpose, one that illustrates the gauntlet that a winery's advertising must safely pass through. Notwithstanding label approvals, a winery's labels and advertising must comply with industry and agency standards that go beyond the immediate reach of the TTB.

Today's food packaging seems to overwhelm consumers with specific nutrition information. Figure 2 is an example. Low fat, low sodium, whole grains, fruit, nut, multigrain, fiber — consumers are misdirected to these claims rather than the information on the nutrition panel. Whether selling alcohol based on its caffeine content, its resveratrol levels, its carbohydrate or caloric content, or its alcoholic strength, these advertising claims all run the risk of exposing the products to closer scrutiny not only from the TTB and the FTC, but also from the very consumers who purchase these products.

1. New Media

Wineries are rapidly utilizing social media websites to advertise their products. Social media websites can reach millions of users, and many sites provide tools that allow wineries to exclude underage viewers from entering their web areas. These gateways are, for the most part, effective in excluding underage visitors from the winery's social community. Social media sites bring with them the interesting phenomenon of social "policing," which, by all reports, appears to work quite effectively.

Although winery websites generally employ a mechanism that requires a visitor to affirm that he or she is over the legal drinking age before being able to view the rest of the content, these gateways are easy to foil by simply saying one was born in 1900 or thereabouts.

Social media websites such as Facebook, on the other hand, do not rely on such age affirmation devices, but rather on gateways that wineries can raise to prevent underage viewers from joining the community. However, the social media sites generally do require users to post a profile that includes the user's age.

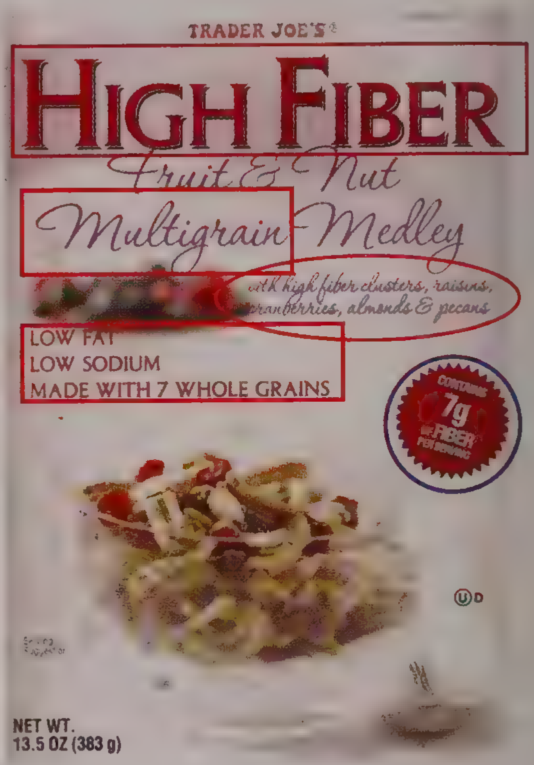


Figure 2: Trader Joe's High Fiber Cereal

It is the user's personal community that monitors the veracity of the user's profile. In other words, someone who says she is 16 years of age on Facebook, for example, is probably 16 years of age. Someone who says she is 21 when she is actually 16 will be pressured by her Facebook friends to come clean. This is not true in all instances, but so far advertising of alcoholic beverages on social media websites has not raised issues with the FTC so long as these gateways are deployed.

All of the industry advertising codes apply to electronic media but not with any great precision. Wine Institute will be reviewing its Advertising Code and updating it with new media provisions throughout the 2010–2011 fiscal year, but it has been encouraging an opt-in approach for social media sites, advising its members to require that visitors affirmatively grant permission before being connected to winery social media areas and receiving e-mails that may be generated by the social media site itself.

Requiring visitors to opt in has additional advantages. Many social media sites will generate e-mails automatically based on some event that occurs on the site; for example, someone adds a winery event to a social media site and the site itself generates e-mails to the winery community, or someone adds a comment in a discussion thread and the site generates e-mails to all members of the community that have requested e-mail notification.

2. "Do Not E-mail" laws

Most computer users hate spam, yet all accept the massive amounts of unsolicited e-mail as a necessary although an unwelcome part of being online, and they buy into services and software to manage it. Although the "do not call" registry that the FTC launched has worked well to prevent those telemarketer phone calls, attempts to control spam on a national level have not met with great success. [See FTC, National Do Not Email Registry: A Report to Congress, at i (2004), available at www.ftc.gov. reports/dneregistry/report.pdf (Last visited Jan. 21, 2011).]

Yet today's electronic media and automatic e-mail generation features raise special issues with wineries because of the "do not e-mail" laws in Michigan and Utah. If winery e-mail marketers and social media users send advertising messages (or cause them to be sent) to e-mail addresses or domains listed in either state's child protection registry, they may face stiff penalties.

In 2005, Michigan and Utah enacted laws that create a children's protection registry in each state. [See What You Need to Know About the Michigan Children's Protection Registry, Project MI Child, www.protectmichild.com/ (Last visited Jan. 21, 2011); Protect Your Family's Addresses, Utah Kids Registry, www.utahkidsregistry.com (Last visited Jan. 21, 2011).]

The purpose of both laws is to prohibit certain vendors from sending (and thereby prevent minors from receiving) electronic messages that advertise a product or service that a minor is prohibited by law from purchasing, viewing, possessing, or participating in. These communications include those for wine and other alcoholic beverages, tobacco products, and pornographic materials.

The registries in Michigan and Utah allow parents and guardians in those states to register "contact points," including e-mail addresses, mobile phone numbers, fax numbers, and instant messaging user names, for inclusion in the registry. Once entered, these contact points are deemed protected and are thus off-limits to such communications.

The Michigan and Utah laws apply to any communications made after August 1, 2005, and August 15, 2005, respectively. It does not matter if the mailing was previously requested or if users had previously opted in to receive future e-mails.

Wineries are considered "senders," and in order to comply with the law, they must match their mailing lists against the registries on a monthly basis, for which they must pay both Michigan and Utah a per-e-mail-address fee. Violations can be costly; both states prescribe both civil and criminal penalties. Wineries can pay a fee to have their e-mail lists "scrubbed" by third-party providers.

E-mail addresses are, by nature, portable and not geographic (for example, a person may have moved from California to Michigan but kept the same e-mail address), so a winery utilizing an online service that features automatic e-mail generation must exercise caution if e-mail addresses are not kept up to date or have not been validated.

3. Green Claims

The FTC's Green Claims Guide at 16 CFR §260, issued in 1992 and updated in 1998, has guided advertisers for many years, but advertisers increasingly have been making environmental claims. Wineries are claiming their own stake in the environmental movement and have advertised their investments in the environment. If wineries claim to be "carbon neutral" (see Figure 3), "sustainable," or "biodynamic," they must be able to substantiate those claims with competent and reliable evidence. Like other claims, green claims must be factually correct and supported by sound evidence.

Guidelines for the making of specific green claims — "compostable," "biodegradable," "recycled," "ozone safe," and other general claims — can be found in the FTC's Green Claims Guide [Guides for the Use of Environmental Marketing Claims, FTC, www.ftc.gov/bcp/gmrule/guides980427.htm (Last

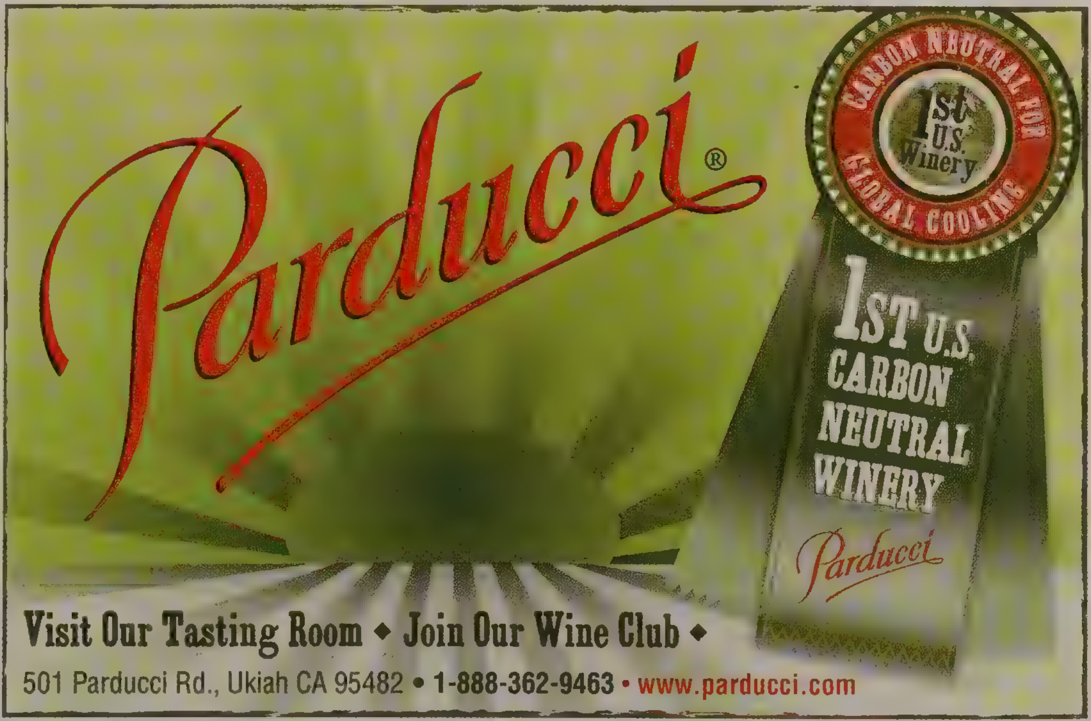

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Figure 3: Parducci advertisement

visited Jan. 21, 2011).] These guidelines are currently under review.

The making of unsubstantiated environmental claims is an increasingly relevant issue, as producers and retailers reposition their products to consumers as environmentally friendly. Although wineries have not yet been the subject of such action, the Sigg water container/BPA debacle [Sigg manufactures aluminum bottles. During the bisphenol A (BPA) controversy in 2008 and 2009, consumers abandoned plastic water bottles in favor of reusable metal bottles to reduce waste and their exposure to BPA. Sigg took advantage of this and strongly implied that its bottles were BPA-free, even though the liner for the bottles contained small amounts of BPA. Sigg eventually confirmed that BPA was used in the production of its bottle liners. Consumers reacted strontly, and Sigg eventually offered bottle replacements for all customers that purchased bottles with the BPA liners. Sigg still faces a number of lawsuits. See Bonnie Rochman, "How Green Is your SIGG Water Bottle?", Time, Oct. 27, 2009, available at www.time.com.time.health/article/0,8599,1932826,00.html (Last visited Jan. 21, 2011).] from 2009 illustrates that few things will destroy a company's reputation faster than a green misstep.

Conclusion

I am a wine label junkie and a Part-4 addict. It started out innocently enough, with forms to review, and class and type designations to determine; then, when I got to varietals and appellations, I was hooked. It is shameful, I know, but I must admit that I am totally in awe when I see a good wine label or advertisement.

The goal of this chapter is to get you to say to yourself, "Gee, I did not know that!" If I have done that, I have accomplished my task. As should now be clear, every element of a wine's label has been scrutinized and been the subject of at least one federal rulemaking. Wine labels and the information on them are also part of a larger universe of regulations and laws than you might have first imagined. Indeed, label design is not only about art, but law as well.

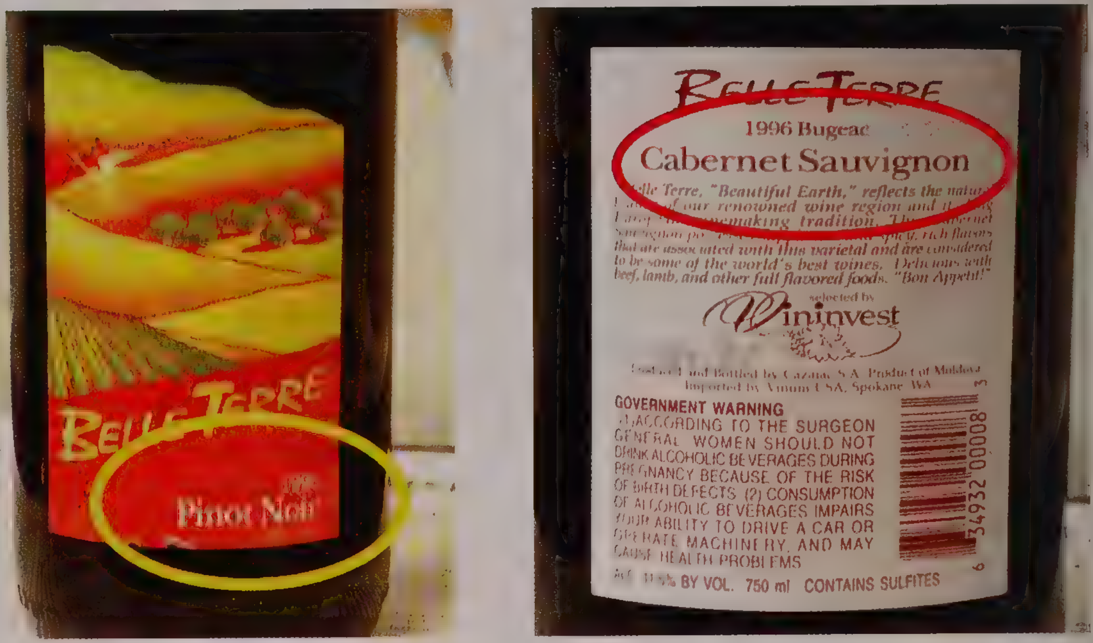
Belle Terre
Pinot Noir
Belle Terre
1996 Bugeac
Cabernet Sauvignon
Belle Terre, "Beautiful Earth," reflects the natural beauty of our renowned wine region and its long history of winemaking tradition.
that are associated with this varietal and are considered to be some of the world's best wines. Delicious with beef, lamb, and other full flavored foods. "Bon Appetit!"
selected by
Vininvest
Imported by Vinum USA, Spokane WA
GOVERNMENT WARNING
(1) ACCORDING TO THE SURGEON GENERAL WOMEN SHOULD NOT DRINK ALCOHOLIC BEVERAGES DURING PREGNANCY BECAUSE OF THE RISK OF BIRTH DEFECTS (2) CONSUMPTION OF ALCOHOLIC BEVERAGES IMPAIRS YOUR ABILITY TO DRIVE A CAR OR OPERATE MACHINERY, AND MAY CAUSE HEALTH PROBLEMS
BY VOL. 750 ml CONTAINS SULFITES

Figure 4: Moldovan- Belle Terre label

I leave you with my favorite wine label, one from a bottle that was purchased at a local retail store when Wine Institute was investigating Moldovan wine. It is shown in Figure 4. On the brand label, it is a Pinot Noir. Turn the bottle around, and it is a Cabernet Sauvignon!

There are countless examples of beautiful wine labels, dramatically telling of the land that claims it and the people who bring it to you. Wine labels are a reflection not only of the wine and its geography, but also of the people behind the label. I have been blessed with a job that puts me in contact with winery owners and staff who have proven to me time and again that the quality of their products is surpassed only by the quality of their character.

More and more, labeling and advertising are being influenced by large retailers, eager marketers, and consumer trends. Yet when winery members meet at Wine Institute to discuss label rules, it is clear to me that their goal is to establish reasonable label and advertising standards that embody the ethics of the wine industry and reflect their commitment as individuals and as businessmen to responsibility and quality. ■

(Endnotes)

1 See Maggie Rosen, First Hello Kitty Wine on the Market, Decanter (June 4, 2009), http://www.decanter.com/news/wine-news/484739/first-hello-kitty-wine-on-the-market (last visited Jan. 21, 2011).

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SMART VITICULTURE *by Dr. Richard Smart*

Separating premium from poor fruit

Grapevine attributes in vineyards and vineyard blocks are not homogeneous and make planning of harvest challenging to obtain premium fruit. This column is Part II following the Fall 2011 *PWVJ*: "Estimating wine quality before harvest." That column described my consulting experience at the Raimat Winery in Spain, where I developed a system that could be used as a guide to setting grape prices.

I want to discuss studies made in Washington and California and reported in the Summer 2011 *PWVJ* by Kurtural, Wample, and Smithyman ("Differential harvesting in winegrape vineyards").

Generally, vineyard blocks are laid out in relation to farm boundaries and other constraints rather than being selected on the basis of the soil homogeneity. There can be substantial differences of yield, vigor, fruit composition, and potential wine quality within a block, some of these up to tenfold. These differences can occur in both dryland and irrigated vineyards. High vigor vines are usually those growing on deeper topsoils; their increased vigor is explained by more readily accessible soil water, and in some cases nutrients.

In general, grapes from high vigor vineyards produce low wine quality, because the fruit and leaves are shaded — a basic premise of canopy management. Medium and low vigor vines, on the other hand, typically have less dense canopies because vegetative growth is restricted, so there are fewer and smaller leaves.

On the other hand, very low vigor vineyards do not necessarily have the highest potential for wine quality. Such vines may be excessively stressed so that although the canopies are very open, with good leaf and fruit exposure, leaf health is poor and function is restricted due to excessive stress.

Studies in Australia, New Zealand, and the U.S. have affirmed that high vigor vineyards produce low quality wine. Such vines also have higher yields, which has led to the mythology that high yields lead to low quality wine.

Benefit of aerial infrared imagery

Aerial infrared images may cost as little as three dollars per acre according to the Washington experience outlined below, and yet the amount of information they can provide is invaluable. Such images indicate the canopy density of vine rows and by mapping values of vegetation density (called NDVI (Normalized Difference Vegetative Index) or Plant Cell Density (PCD) index, one is able with GIS software to divide vineyards into vigor zones. NDVI and PCD are mathematically related, and although the relative values are different they both describe similar reflectances from the vegetation, and therefore canopy density.

An aerial image with color-coded PCD values, can be divided into vigor zones. The boundaries between zones are quite arbitrary, and the same vineyard could be divided into two, three, four, five, or even ten vigor zones.

American experience

Ste Michelle Wine Estates in Washington has been using this technology since 2003, and it is now employed on 90% of their own vineyard area and some contract blocks. This is a noteworthy achievement. Not only are the aerial infrared images a useful guide in modifying vineyard management to reduce within-vineyard variability, but they can also be used for differential harvesting.

Ste Michelle has investigated using up to 10 vigor zones per block and also flagging to allow differential hand harvesting, but their experience has led them to use mechanical harvesters feeding either one of two gondolas with a classification into just two vigor zones.

Their harvester feeds fruit to one side only and the two gondolas are in the same tractor row. The gondolas move backward and forward based on a traffic light system operated by the harvester driver, who uses the vineyard NDVI map on a PDA to determine transition between vigor zones. This classification into potential vigor zones is based entirely on canopy density as predicted by NDVI.

In California, more emphasis has been placed on mapping fruit composition as a basis for vineyard zoning. Recent instrument advances have allowed parameters such as sugar, acidity, and berry anthocyanin to be assessed using "point-and-shoot" NIR instruments. Many samples can be quickly taken in the vineyard and in conjunction with GPS location, maps of fruit composition can be produced. These can then be used to divide the vineyard into "quality potential zones," typically based on fruit anthocyanin.

This has been the approach of Woodbridge Winery with Twin Creeks Vineyard fruit and a Constellation winery on a 159-acre block of Cabernet Sauvignon in Madera County. Both of these studies, conducted over several years, have reported little effect of vine yield on fruit composition, which is perhaps a surprising result to those who believe yield is a major determinant of fruit composition and wine quality.

These studies have confirmed that a combination of aerial imagery and differential harvesting and fermentation allows the provision of more uniform fruit lots to the winery. So the winemaker's job is made easier, offering more opportunity for blending wine lots **after** fermentation rather than different fruit being blended **before** fermentation.

Tasmanian studies with Pinot Noir

A Pinot Noir vineyard at Goaty Hill Estate (Kayena, Tasmania), was drip-irrigated on a duplex soil, own-rooted with an unknown clone. The principal difference in vigor

Continued on page 113

by Ann Reynolds, Wine Compliance Alliance

Having a successful relationship with your shipping software

Acronyms get tossed around in the wine industry, particularly those related to compliance, such as TTB, ABC, COLA, and CDFA In the past couple of years another acronym has joined their ranks: TPP, which is short for third-party provider. TPPs are essentially marketing businesses that assist wineries by promoting their products, using the most current range of web sales channels, thus dramatically expanding their exposure.

ABC updates impacting DTC compliance

The California Department of Alcoholic Beverage Control (ABC), as part of its regulatory authority, has taken issue with the details of these new types of sales transactions. In 2009 they issued an advisory to wineries that they needed to be very aware of their responsibilities when using TPPs to promote and sell their wines. The problem was that the whole concept of TPPs and their web-generated sales was still fairly new and thus a whole new area for the ABC to wrap a clearly defined regulation around.

In an effort to address continued requests from industry members, the California ABC issued a follow-up advisory on November 1, 2011, which more fully clarifies the responsibilities the licensees hold when interacting with TPPs for promotion and sales of their wines.

From a compliance perspective, the ideal situation is for wineries to be on the same page as the many state and federal agencies that regulate them. For instance, shipping is an area of compliance that is generally complicated and maze-like, which means that wineries need a clearly defined system for managing all their shipping compliance files; from licenses to reports and brand/label registrations.

Using software as a compliance tool

Shipping software has been specifically developed for this purpose, including Ship Compliant, E-Winery, and E-Compli. The use of these and other compliance software platforms has grown in recent years as wineries are increasing their direct-to-consumer (DTC) shipping to other states and have realized the value of a computerized system that manages it all in one place.

For a winery to be successful in using shipping software, certain steps need to be followed. The steps listed here apply both to wineries already using shipping software and those just starting out.

The first step is to organize all the hard copy files. This involves locating all federal and state licenses, state tax registration information, federal label approvals, and copies of all brand or label registrations required by some of the states. Each of these items can then be scanned and saved in digital form, ready to be uploaded into the shipping software screens related to each category. This will give the winery a big picture view of all of their state licenses, which will help them manage their shipping activities by state.

The next step is day-to-day order entry. Entries come from sales activities at the tasting room (on site) or from sales made via web sources (off site). Ideally the software used for tasting room and web-generated sales links directly into your shipping software. This eliminates the need for double entry, and orders that have any issues are flagged by the software so users know right away to follow up and address them.

No matter how much experience a winery has with shipping software, it is always a good idea to double check that your upload feeds of order data are coming through successfully. The setup for this linking step is most commonly taken care of by either your tasting room POS (point-of-sale) software provider or by your webmaster for web-related sales. But because neither of these is as regularly involved with your shipping activities as you are, setting up a regular course of in-house self-checks can save some big messes down the road. Like in the sports world, the best defense is a good offense when it comes to shipping compliance maintenance.

The third step, once the shipping software is fully set up and functioning, is the maintenance stage. Maintenance is key for all areas of winery compliance systems, but because of the especially dynamic nature of shipping compliance, following a regular and regimented maintenance protocol can mean the difference between success and failure.

Additional elements for shipping compliance success

Two valuable suggestions to help wineries successfully maintain their direct-to-consumer shipping compliance systems are:

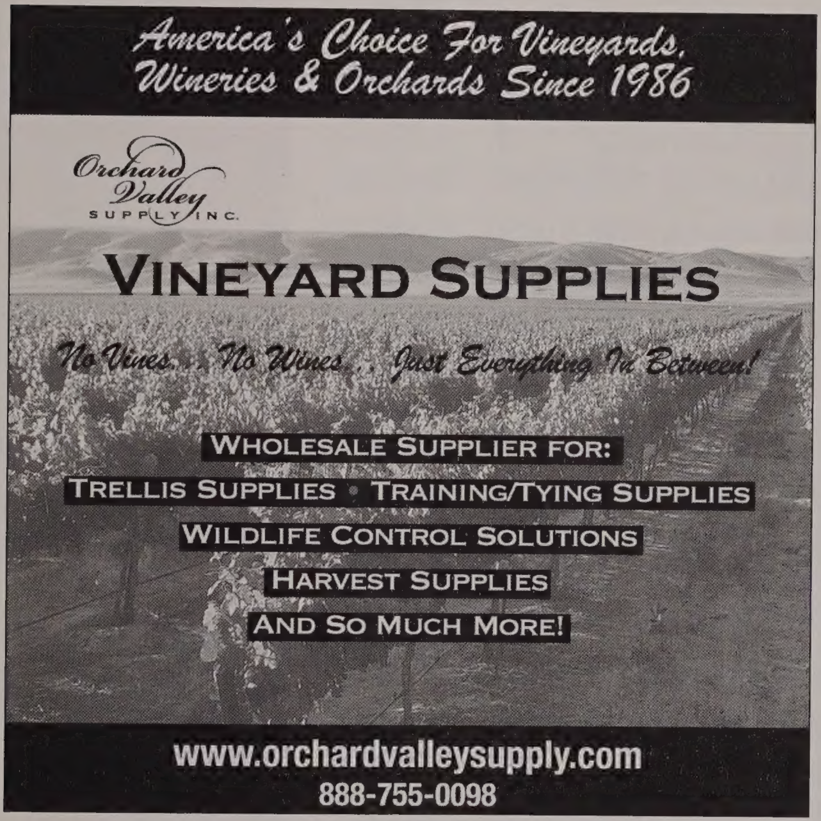
1. Develop a manual for the procedures followed to update and maintain your shipping software. The manual needs to delineate clearly defined roles of responsibility. It should list details on who, what, when, and how of your DTC compliance. For example, it lists that one staff person is responsible for filing all monthly reports by the 10th of every month and lists the step-by-step details on how that is completed.

2. Spend some time cross-training at least two others who have some interaction with the shipping activities. Tasting room staff are candidates for this. The idea here is to have enough staff familiar with your DTC compliance systems when any of the regular staff is on vacation, out sick, or leaves the winery. Having a cross-training program also sets into place checks and balances.

Conclusion

Any type of software is designed to make a process easier and more organized. With continual updates and changes in regulations regarding shipping wine to consumers across the country, the smart move for a winery is to select a program that fits them, set it up properly, and maintain it regularly. The winery can also use this software to continually assess shipping statistics to see where they are getting the biggest response to their wines. Shipping compliance software is an invaluable tool that if used properly saves a winery time, money, and headaches. ■

Ann Reynolds is a wine compliance educator, author, and speaker with more than 20 years of experience in the wine industry. Ann teaches classes in many areas of wine compliance at Napa Valley College, Sonoma State University, and UC Davis, and provides wineries with on-site compliance audits and system development. She can be contacted at: ann@winecompliancealliance.com.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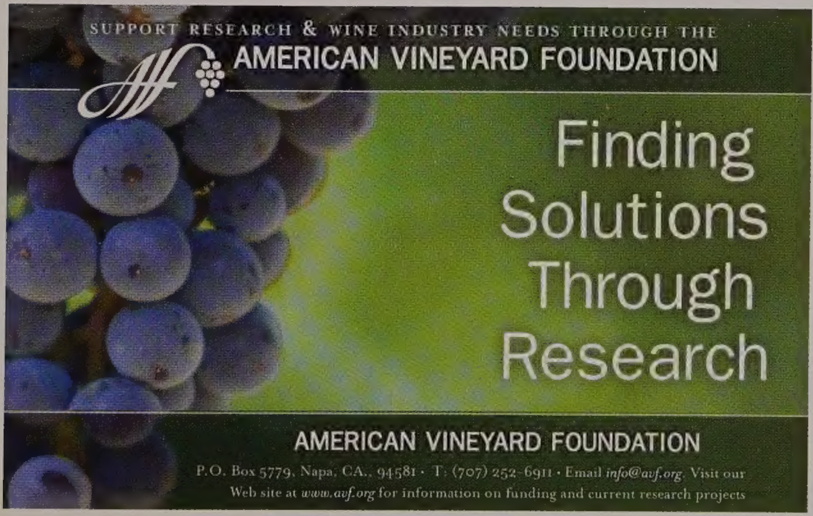
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Smart Viticulture

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was due to differing depths of sandy loam topsoil, as the subsoil was relatively impenetrable to roots and prone to waterlogging. Vines were trained to vertical shoot positioning (VSP) and the higher vigor vines were dense and shaded. Lower vigor vines had a more open canopy with a better balance of vegetative growth and fruit. The overall yield was 2.3 tons per acre. Aerial images were taken at veraison, and were divided into four vigor zones based on PCD values.

In the 2010 vintage in Tasmania, separate micro-ferments were made with seven replicates each for the four vigor zones. The lower vigor zone averaged 1.6 kg per vine yield and the highest vigor zone 2.9 kg yield, with the other two vigor zones intermediate. The zones yielded no significant differences in sugar or pH, but higher vigor vines had more acidity, probably due to malic acid.

The wine color density was higher for the lower vigor vines — almost double the value for wine from higher vigor vines. Values for intermediate vigor zones were between these extremes. Similarly, values for anthocyanin, total pigments, total phenolics, and tannin showed a ratio of low vigor value to high vigor value close to 2 to 1. This experiment showed that vigor zones could be defined working from the aerial image only, and that these vigor zones were reflected in wine composition values.

Conclusion

There is no doubt that aerial imagery is a cost-effective yet highly discriminatory technique that can be used to define vineyard attributes relevant to wine quality. In commercial application in the U.S. it has been shown effective for dividing vineyards into two "potential quality" zones that can be economically harvested by machines. However, in the future, with improvements in harvesters and gondola arrangements, dividing vineyards into more zones may be possible.

I am not convinced that developing fruit composition maps using near infrared (NIR) analysis is the best way for differential harvesting to progress. We know that grape sugar is generally not a useful measure of potential wine quality. I am inclined to believe that simple measurement on the vines themselves, rather than on the fruit, is a better means of vineyard classification. We will see in the future which approach delivers the best results. ■

Dr. Richard Smart is rewriting and thoroughly revising Sunlight into Wine. *He is happy to receive statements from growers and winemakers about their commercial success with various aspects of canopy management. Interested persons should contact Dr. Smart by email at richard@smartvit.com.au. Dr. Smart visits the U.S. frequently, and consulting appointments can be made by email. See also www.smartvit.com.au*

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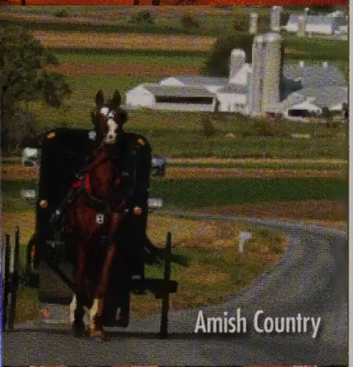

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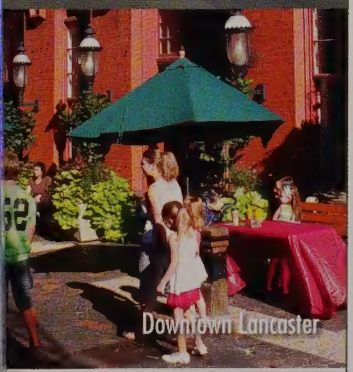

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